With Compliments of Theodore B. Sano.

REPORT

OF

BREVET BRIGADIER GENERAL N. MICHLER,

MAJOR OF ENGINEER CORPS, U. S. ARMY.

IN CHARGE OF

PUBLIC BUILDINGS, GROUNDS, WORKS, ETC.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1868.

REPORT

OF

BREVET BRIGADIER GENERAL N. MICHLER,

MAJOR OF ENGINEERS, U. S. ARMY,

IN CHARGE OF

PUBLIC BUILDINGS, GROUNDS, WORKS, ETC.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1868.

Digitized by the Internet Archive
in 2017 with funding from
This project is made possible by a grant from the Institute of Museum and Library Services as administered by the Pennsylvania Department of Education through the Office of Commonwealth Libraries

https://archive.org/details/reportofbrevetbr00unit

REPORT.

OFFICE OF PUBLIC BUILDINGS, GROUNDS, AND WORKS,
U. S. Capitol, Washington City, D. C., September 30, 1868.

GENERAL: The following report of the condition, at the close of the last fiscal year, of the several public buildings, grounds, and works in my charge, and under my supervision, is respectfully submitted for your consideration.

RIVER CHANNEL IMPROVEMENTS.

By orders from headquarters Corps of Engineers, No. 67, dated July 27, 1867, the examination and surveys of the Potomac river, in the District of Columbia, were assigned to me, with instructions to report upon some system of improvement in reference to its navigation. A detailed report, with accompanying maps of the last survey, and also of those made in previous years, was presented on the 30th of April, and plans submitted for accomplishing the object. The following is a brief recapitulation of the suggestions then made, and which subsequently met your approval. It was recommended in the first instance to dredge out that portion of the Virginia or Georgetown channel where the existence of the shoal water demands it, and also to the same extent the Washington or city channel, below the Long bridge, so as to obtain a suitable depth of water in each for such sea-going vessels as are of a proper tonnage for the trade of the river. The present channels will then be preserved for immediate use in the event of no funds becoming tangible within a reasonable time for more extended and important improvements. These will be attended with very little expense and not much loss of time. The removal of the causeway of the Long bridge, a somewhat formidable obstacle to either river current or ocean tide, is necessary, having proven very injurious to the Washington channel; it can be replaced by either an arched bridge or one on piles of iron or wood. The plan for a permanent improvement consists in the opening by dredging of a new channel near the Washington shore. A reference to the report will furnish the data and reasons for reaching the above conclusions, and also the estimates for executing the different sections of the work; the sum total is required for its entire completion, and the whole amount can be profitably expended in the present fiscal year, should an appropriation be made during the early part of the next session for that purpose. The improvement is located in the commercial district of Georgetown, and the tonnage of vessels belonging to the district amounts to 22,455 tons. The collector furnishes the following information:

> The number of vessels entered for the last year, (1867,) 373; number of vessels cleared for same time, 205. You cannot judge of the amount of business done in this district from the number of vessels entered and cleared, for those in the coasting trade are not required to enter or clear at the custom-house, unless they have foreign goods or distilled spirits on board; there are at least 20 vessels arriving here which do not enter or clear for each one that has to do so.

Besides the very great advantages which would ensue to Washington and Georgetown, and in which the general government is deeply interested, by the contemplated improvements, in a business and commercial point of view, other most beneficial results would be derived from their

execution. The low marshy flats which now line the river front of the city, tending so much to induce an unhealthy condition of the atmosphere, and presenting so unsightly an appearance, would be reclaimed, and in a short time, it is to be hoped, greatly enhance the extent and beauty of the public grounds about the monument which is being erected to the memory of Washington. Again, by opening a cut for the old Tiber, or what is now styled a canal, to pass into deep water of the new channel, the sewerage of the city, a subject which should receive the most careful and studied attention on the part of every inhabitant, would be scoured off by the strong current of the river, instead of spreading over the flats and generating pestilential vapors with which to infect the whole community. These great advantages will certainly deserve the consideration of Congress, of the corporations of the two cities, and of every reflecting citizen, and compensate for the comparatively small pecuniary expense of the undertaking. No other city possessing the prominence of the capital of the nation would long hesitate to take advantage of and prosecute this great improvement, both in a hygienic point of view and for the advancement of its commercial interests. Most assuredly the means should not long be forthcoming.

BRIDGES.

Benning's bridge, over the Anacostia, or Eastern Branch, having been almost entirely rebuilt during the last year, is in very excellent condition; the painting of the railing, with some slight repair to the flooring, is all that has been required. The Navy Yard bridge, over the same branch, is constantly in want of repairs to the flooring of the roadway, in consequence of the great amount of travel over it. A new walk has to be laid for pedestrians, and the causeway approaching it requires to be raised and re-graveled. Uniontown, at the eastern terminus of the bridge, is constantly increasing in numbers, and a large proportion of its population, and that of the surrounding country, together with great quantities of produce, pass over this bridge into the city of Washington. Application has been made to Congress to incorporate the Uniontown and Washington City Railroad, with authority to construct and lay down a double or single track railway through and along certain avenues and streets, and then across this same bridge. A resolution of the Senate of the United States, June 20, 1868, directs me "to make a survey of the lower bridge, known as the Navy Yard bridge, across the Anacostia, and report a plan for a permanent structure across the same, at or near the present site, capable of sustaining a railway track and cars, with a footway on each side of the carriage track, with an estimate of the cost of the same." Surveys for the site have been made, and a report with plans will be in readiness to submit to you in time for the next session of Congress.

The Long bridge was placed in as good repair during the last year as the small amount of the appropriation would admit, and has, until very recently, been kept in a passable state.

The draws, however, have been constantly getting out of order, and lately it was deemed necessary to suspend travel over the bridge in order to replace the heavy weighty one, near the north terminus by an entirely new and lighter plan, and to thoroughly overhaul the south one. In addition to this improvement repairs are being made to the roadway and footwalks, and the brick walls and railing are being renovated and whitewashed. Owing to the general worthless construction of this bridge annual appropriations will be required to preserve it even in passable con-

dition. Work is, and will be, required to make it stand until a more substantial, suitable, and architectural structure be built to span the magnificent Potomac. In the event of the improvement of the channels of the river, the causeway should certainly be removed. In my report upon this subject it was stated "that the bridge question was so intimately associated as to necessarily form a part of the discussion." It continued to say that some "very interesting and comprehensive reports in reference to bridging the Potomac at several points have been carefully examined, and the subject found to be very thoroughly exhausted. Should either of the plans proposed in reference to the present site of the Long bridge be adopted, it would necessitate the removal of the causeway." In the judgment of the engineers who have examined the subject, the present locality of the bridge does not possess any particular advantage, save more direct communication between the city and the Virginia shore, while it certainly possesses very great disadvantages. The necessary greater length of a permanent bridge at this point would render its construction proportionately more expensive, and it could not be well built without, as it now does, seriously interfering with navigation; one or more draws would certainly be required, which must prove a very great hindrance to travel, especially that by railway, as well as to the passage of vessels. The greater danger to travellers is a matter to be carefully considered, as many accidents are constantly occurring from carelessness in attending the draws. The Long bridge has been for so many years the means of intercourse between the city and the opposite shore, that it would be very difficult to divert attention from the old, well-beaten track.

The aqueduct bridge, over those splendidly built piers constructed some 30 years ago by Colonel Turnbull, is now being arranged, in addition to canal purposes, for ordinary road travel, by the company leasing the Alexandria canal. It is to be opened to the public, on or before the first of March of the coming year. Certain rights and privileges have been granted this company by the government and the State of Virginia. By an act relating to the Alexandria canal, approved July 27, 1868, the company is authorized and empowered to maintain and operate said aqueduct, and to erect, build, operate, and maintain upon and over the stone piers upon which the aqueduct now rests, in conjunction therewith, a bridge of wood, iron, or stone, with one or more ways for the passage of persons, animals, and vehicles, and also with one or more tracks for the passage of engines and cars; and that as soon as the chief engineer of the army shall certify to the Secretary of War that the said bridge is completed, the company may demand and receive certain specified tolls.

The Chain bridge over the Potomac, at the Little Falls, about three miles above Georgetown, is still in a very dilapidated condition. Owing to the late period of the last session of Congress at which the appropriation was made for repairing it, very little has been done. Work will be resumed upon the receipt of the necessary material, and pushed rapidly forward. It is believed that the sum appropriated will be sufficient to place it in good repair and preserve it so for many years; the ordinary wear and tear of the roadway will alone have to receive attention. There is a very great amount of travel over it; large quantities of produce, and thousands of head of cattle, reach the Georgetown and Washington markets by this bridge.

Average amount of travel over Potomac, Navy Yard, Little Falls, and Benning's bridges per month.

Name.	Foot passengers.	Horses and riders.	Horses and wagons.	Teams and wagons.	Cattle.	Hogs.	Sheep.	Vessels passing the north draw.	Vessels passing the south draw.
Potomac (Long bridge)	18,604	2,299	4,544	3,894	504	780	334	280	700
Navy Yard	21,654	1,195	7,408	5,920	367	263	412	1	.....
Little Falls	5,020	3,968	4,130	5,079	2,177	900	.....	.....	.....
Upper (Benning's)	1,330	435	1,210	1,704	133	60	3,567	.....	.....
Total	46,608	7,897	17,292	16,597	3,181	2,003	4,313	281	700

PUBLIC SQUARES, RESERVATIONS, NATIONAL PARK.

In my last annual report it was stated that "the plan adopted by General Washington for laying out the capital of the nation, consists of wide streets and avenues intersecting each other; the former running from north to south, designated by numbers, and from east to west, called by letter, cross each other at right angles; these are again cut diagonally by avenues bearing the names of the different States of the Union. In consequence of this system, many public places have been formed, consisting of triangles, circles, and squares; in different parts of the city sections are set apart as reservations for the benefit of the citizens and for public buildings. Many of these have already been beautified, and the remaining ones should be improved as early as possible. While adding so much to the appearance of the city, they at the same time largely contribute to the health, pleasure and recreation of its inhabitants."

Lincoln Square is located at some distance to the east of the capitol, and is the only public reservation in that section of the city which is undergoing any improvement. It is one of the largest squares, being about 825 feet in length by 335 feet in breadth, and was especially ordered to be laid out by act of Congress, as a tribute to the memory of the distinguished man by whose name it is called. Not much more can be done towards its adornment during the present fiscal year than to fill it up to the proper grade of the surrounding avenues and streets, and in the fall to plant trees and shrubbery. No less than four avenues, Massachusetts, Kentucky, North Carolina, and Tennessee, and four streets, East Capitol, Eleventh, Twelfth, and Thirteenth, radiate from it, and the main thoroughfare, Pennsylvania avenue, is not far distant; it is therefore one of the most accessible squares in the city, and will in time become one of the most ornamental should the necesary appropriations be made to continue the improvements which have been commenced; the one for the present fiscal year will soon be expended, and another is submitted for continuing the work.

Capitol Grounds.—No appropriation has been made for some time for the improvement or preserving these grounds; save to trim the trees, mow the grass, and clean the walks, very little has been attempted. The grounds in the east have been a great resort for parties desiring to indulge in the game of croquet, and on one day in the week becomes a favorite place for the denizens of the city to listen to the music of the band attached to the marine corps. Owing to the trampling of feet over the grass, and the

severe drought during the summer, it at one time failed to present a very attractive appearance. Orders had to be given to cease the favorite game, and through the intervention of refreshing showers the grounds soon resumed their accustomed attractiveness. In consequence of the gradual rise of these grounds away from the Capitol, the view of that magnificent building is concealed from the more eastern sections of the city. The grade should be made to descend from the structure, so as to place it in a more commanding position. The earth excavated from this section will be needed in the further extension of the public grounds surrounding the Capitol. A bill for the purpose of enlarging them has been introduced into the Senate, proposing "to extend them between First street east and First street west, northwardly to the south side of north B, and southwardly to the north side of south B street, including, in addition to so much of the reservations, avenues and streets as are necessary for such extension, the two squares designated on the plan of the city of Washington as 687 and 688, respectively." The enlargement has been carried on under the immediate supervision of the architect of the Capitol. It is to be regretted that heretofore the appropriations have been so very limited as scarcely to be able to make an impression or give an insight into the plan of the proposed improvement. It is to be hoped that future legislation will remedy this defect, and that ere long the magnificent pile will stand out in all its superb proportions, untrammelled and not disfigured by its present surroundings. In this immediate connection attention should be directed to that part of the city by which the great line of railroad from the north approaches the capital. It is a constant marvel to every visitor and traveller that so little has been done towards the advance of improvement in that direction. Under the very eaves of the Capitol, within a stone's throw of its north portico, the eye is forced to rest upon one of the most unfinished, unsettled, and offensive localities—and there are many of them—within the city limits. This no doubt is principally in consequence of the railroad passing through, and also somewhat owing to the low nature of the grounds. Should the extension north of the Capitol grounds reach B street, it will be found that the depot of the Baltimore and Ohio railroad, a scene of so much activity, bustle, and noise, is within a block of the proposed limits; the running of the trains is now distinctly heard within the halls of the Senate, and the shrill screams of the engine must frequently interfere with debate. The rails are laid in the centre of Delaware avenue, which radiates from the Capitol, and will indefinitely retard its improvement unless measures are taken to remove them. North A street, leading directly from the building, should become one of the favorite drives towards some of the most attractive environs of the city; it is now made entirely impassable by the crossing of the several railroad tracks, and from having been left ungraded for many years past; no attempts have been made to render it even accessible, much less to improve it. In every part of the city streets are being opened and the grades established, but here we have the spectacle of a fine broad avenue, directly in front of the north wing of the Capitol, left in a most deplorable condition. Some legislative action should be taken to remedy the evil by changing the line by which the railroad enters the city; if correctly informed, the company, some years ago, proposed a plan with that object in view. The grounds to the west of the Capitol have always presented a very handsome appearance, and have been kept in excellent order. In consequence of their being of rapid growth, a great many very ordinary trees, principally species of poplar, have been planted and allowed to grow up and spread to the great injury and crowding of more valuable and beautiful

kinds; it is my intention to have them removed at an early day. The iron fence and its foundations will be repainted and renovated, and other repairs made, an appropriation having been made for the purpose.

The improvements in the botanical garden are progressing very satisfactorily. The work on the culvert, which so beneficially transforms the exposed bed of that portion of the Tiber passing through the grounds into an extensive sewer, and enables a uniform grade to be established, was suspended last year in consequence of the smallness of the appropriation, but the work has since been resumed, and will be completed in a very short time. This will prove a valuable addition, and it is only to be regretted that means are not available to extend it over the adjacent portions of the canal. The work on the fence around the garden has been suspended for want of funds; an appropriation for finishing the enclosure is included among my estimates. As has been already stated, the pavement on the north front (the south side of Pennsylvania avenue) should be regraded and repaved, as it is now much below the grade of the avenue. A pavement should also be laid along Maryland avenue on the south front; these improvements should be of flagging, which will greatly add to the fine appearance of the garden. Owing to the changes now taking place on the grounds, additional walks will be required; it is recommended that an appropriation be made for the purpose. The paths should be handsomely paved, either with the variegated styles used in the public squares of Europe, or uniformly with some one of the beautiful specimens of flagging stone, so as to conform to the ornamental conservatories which are now being constructed under the superintendence of the architect of the Capitol. The Seneca stone, so very accessible to this city, furnishes a very handsome and durable material for the purpose, and no doubt will soon come into very general use.

This garden, one of the most delightful features about Washington, and particularly to strangers, has become a great point of attraction; the many rare exotics, the great variety of our own climatic plants, and especially the handsome collection being made of the several varieties of the many species of trees which adorn our own native soil, will ever engage the attention of both the curious and the cultured.

The grounds directly to the west of this garden are intended for propagating different species of plants, shrubs, and trees, to be used in the embellishment of the different squares. Next adjoining is a reservation, upon which has been constructed during the war, and since, buildings for hospitals, and warehouses for public stores. Already several of these have been removed, and before long all of them will disappear, and it can then be laid out according to the plans originally adopted.

The Smithsonian grounds, or reservation No. 2, lay next in order as you proceed towards the west, and contain an area of 50 acres. Only one portion has been tastily arranged in accordance with the design of Mr. Downing, and a great deal of work remains to be executed before perfecting it. That part lying immediately south of the Smithsonian building has yet to be graded and drained; walks and drives to be spread out over its surface; and trees and shrubbery to be planted. An iron fence should be substituted for the wooden paling, and the walks regravelled; many other minor matters need attention. The fence on the north front, along the canal, should be replaced, as soon as practicable, by a new one.

Appropriations have been earnestly urged upon Congress, but scarcely a sufficient amount has been granted to keep even a proper watch over and for the preservation of such improvements, both useful and orna-

mental, as have already been made. A magnificent institute of learning, and one disseminating practical knowledge far and wide, is certainly entitled to be surrounded by highly ornate works.

The grounds encompassing the Agricultural Department, follow next in order, moving towards the west, and are situated between the Smithsonian and monumental reservations. The building is now entirely completed, save some few interior arrangements, and occupies a very commanding position. A fine view of the city, and parts of the surrounding country, especially the river scenery, can be enjoyed from the different stories of the building, and from the top the eye can feast upon an extensive and almost uninterrupted panorama, which is beautiful to gaze upon. The grounds, some 35 acres in extent, were, until recently, occupied by the department as an experimental garden, but are now being laid out into drives and walks, and ornamental plats for shrubs and flowers, and preparations are being made for establishing a magnificent arboretum. The report of the distinguished Commissioner of Agriculture will, no doubt, describe and illustrate at length the proposed plan of improvement. The drives and walks are being laid with the concrete pavement, a composition of tar, gravel, sand, and ashes. The only approaches to the building are at present by 12th and 14th streets, although it stands south of the canal and directly in front of 13th street. A splendid ornamental iron bridge should be made to span the canal in the prolongation of this street in order to communicate through the large gateway, which it is proposed to erect, with the broad avenue leading to the main entrance of the building; an estimate for a suitable bridge for carriages and pedestrians has been prepared and submitted. In speaking of the approaches to the two public reservations last referred to, it is impossible to refrain from calling the attention of the corporate authorities to the condition of the streets leading to the canal in front of them. Instead of being kept free and open for the purposes of ventilation and health, they are obstructed in every possible way; the many persons frequenting the main avenue of the city are not able to catch even a stray glimpse of the green foliage of the trees, much less obtain a view of the buildings themselves; market stalls extend over the pavements, houses protrude beyond the building lines, piles of lumber block up the way, junk shops encroach upon the public grounds, rubbish is allowed to accumulate, and only within the last few weeks permits have been granted to erect stalls and shops on the prolongation of the center of one of the streets which will entirely obscure the Smithsonian grounds from view. If my information is correct no private citizen has the right to permanently obstruct a street. The same remarks are applicable to the north and south sides of B, or Canal street, between Sixth and Thirteenth streets west. The small pittance of ground rent which would accrue to the corporation fund for granting privileges of the kind should not be allowed to interfere with the general health, the pleasure, and convenience of a large portion of the population of the city. Instead of these many obstacles being thrown in the way the streets should be kept open, and bridges built over the canal for the convenience of those who would seek recreation in the public grounds. The canal is a sufficient nuisance without adding to its nauseousness.

The Washington Monument reservation still remains in the same unimproved condition. The simple preservation of the fence enclosing it is all that has been done. The grounds are capable of very great adornment, and should not be allowed to present the dull, wide waste that they now do. The locality is particularly pleasing, and one from which a superb view of the Potomac can be had. The still incomplete shaft of the monument speaks more forcibly than words. Can it be pos-

sible that a nation boasting of its wealth, grandeur, and extended domain, will longer submit to the disgrace and dishonor of allowing this memorial to the greatest of our patriotic men to remain in its present unsightly, unfinished state?

The Congress of the United States should not hesitate to make a liberal appropriation for perfecting it in all its details, at least in donating a sufficient sum as a nucleus about which the subscriptions of a generous people will amply cluster.

The grounds immediately around the President's house have received great attention, and offer to all a pleasant spot for recreation. Those directly south, towards the canal, and bounded on the east and west by Fifteenth and Seventeenth streets, should now receive the greatest embellishment. By the proposed plan for the improvement, which was adopted by the Secretary of the Treasury, the Supervising Architect of the Treasury Department, and the late Commissioner of Public Buildings, a new avenue will be opened for travel between the two last named streets, and an appropriation, for which an estimate is submitted, is earnestly recommended in order to complete the fences, with the necessary gates, along it. One is also added for fences to enclose the entire extent of the reservation. That splendid building, the Treasury Department, is now very nearly completed, and the various workshops connected with its extension will soon be removed. It is to be hoped that the comparatively small amount required for laying out and beautifying the adjacent grounds will be furnished. The magnitude of the work demands that a thorough and complete plan be adopted for the purpose of adorning them. The several reservations previously referred to comprise what is familiarly known as "the Mall," stretching from the Capitol to the left bank of the Potomac. Their dimensions are amply sufficient for a limited park for a large section of the city. As stated in my last annual report, "these grounds are unfortunately subdivided by several transverse streets running north and south. Should they be made subterraneous by tunneling, the different parts of the mall might be thrown into one, and thereby supply ample and uninterrupted space for walks and drives. As this may not be deemed practicable by many, owing to the level nature of the ground, and meet with great opposition in view of the expense, another plan is suggested to meet the present wants of the community. Let the whole extent of the reservation be laid out in continuous carriage ways, paths for equestrians, and walks for pedestrians, as if the different parts formed a unit. Gates with their lodges could be placed where the different communications intersect the streets, the crossings between them being handsomely paved. The keepers of these gates and grounds, selected from the many dependent and worthy soldiers and sailors, who have been disabled during the war by loss of an arm or leg, could, by some mechanical arrangement, while seated in their lodges, manœuvre the gates, opening or closing them for the passer by." It was proposed during the last session of Congress to introduce a bill organizing a detachment or corps of watchmen from the wounded and disabled of the army to attend to the duties above enumerated. It was reported favorably upon by the House Committee on Public Buildings and Grounds. The channels of the river should be improved and a large quantity of land reclaimed, thereby extending the monumental grounds, and the mouth of the Tiber, or the basin of the canal, should be partially filled, also giving an increased number of acres; suspension bridges should also be thrown across the canal, uniting these grounds with those south of the President's mansion. By some such plan, beautiful and continuous drives can be had between the latter and

the Capitol, free from all the noise and bustle and dust of the busy city. Regulations would have to be adopted to prevent heavily laden traffic from passing along the drives. One of the most charming spots for recreation, and one, where the trees and shrubbery have been set out with so much taste and judgment, is Lafayette square; it has been made very beautiful, but owing to the grounds being so level, the drainage is defective. The government has lately paid a very large proportionate part of the expense of constructing the sewer along the western front, and a system of underdrains leading into it could be adopted, and the objection remedied. The walks have been gravelled, and, considering the small force of gardeners allowed, the place has been kept in very good order.

Owing to the particular advantage of the locality Franklin square will, in the course of a few years, become one of the most splendid improvements in the city. The undulating character of the surface will always add a great charm to its appearance. A very marked change has already taken place in it, but a great deal more has to be done to render it what it is capable of becoming. A large number of trees of different species have been set out, and in course of time various kinds of shrubbery will be planted. The grounds have already been underdrained, and the paths substantially constructed. It is earnestly urged upon Congress to make an appropriation, an estimate being herewith submitted, for replacing the present dilapidated paling fence by a substantial and ornamented iron one, and also for the purpose of further improving the square. For the present fiscal year not one cent has been appropriated either for preserving it in its present condition, or even for the pay of a watchman. An old revolutionary pensioner, and one of the oldest inhabitants in the city, has been temporarily detailed to stand guardian over this beautiful property.

The reservation known as Judiciary square calls for special attention. It is in part under the control of the corporation of the city, and the medical department of the army still occupies the other portion. No very systematic improvement can be inaugurated until the many frame buildings, now filled with government stores, can be dispensed with. It is, however, recommended that the prolongation of E street through this square, which is a very convenient thoroughfare for the residents of that part of the city, should be paved with some one of the improved pavements, and that trees be planted along the walks. An estimate is included to accomplish this much desired object.

Several of the triangular places formed by the intersections of the avenues and streets have been enclosed and sodded during the latter part of the last fiscal year; most of them have already been very prettily ornamented with trees and shrubbery. A great many similar works should be attended to as soon as practicable, as they not only enhance the value of the adjoining property, but also aid in developing the original plan of the city. There are a great many of these vacant places still unimproved, especially in that part of the city east of the capitol. As the corporation has been rapidly progressing in the march of improvement by the opening and grading of streets, setting curbs, paving gutters, and laying pavements, it would seem expedient for the government to keep pace with the progress being made. The two triangular spaces on Vermont avenue, between I and K streets, have been united, and now form one square, to which the name of Winfield Scott has been given. It is proposed to make a corresponding square on Connecticut avenue, between the same streets, as soon as the frame buildings now occupying the public ground can be removed. It has been suggested by one of the

evening journals of the city that names be given to the different triangular reservations, and that they be selected from the list of the most distinguished poets and orators of the nation. It might probably be more in taste to call each after some one of the different species of trees planted in them. The idea is a very excellent one and should be adopted for many reasons. It is also proposed to attach to each and every tree and shrub throughout the different grounds neat labels containing not only the names by which they are familiarly known, but also the botanical one, for the information and education of those who frequent them for pleasure.

The citizens residing in the neighborhood of New Jersey avenue, between H and I streets, are very anxious that a reservation formerly belonging to the government should be repurchased, and a square established for the benefit of that portion of the city. It is a very beautiful and commanding site.

The attention of Congress is again respectfully called to the selection of a site for a grand national park. By reference to my last annual report the subject will be found thoroughly discussed. That portion of the environs of the city known to all as the beautiful and romantic valley of Rock creek, is found to be eminently adapted to the purpose; the character of the ground around and adjacent to that stream is exactly suited to the object in view. It is very accessible, and can now be had at a very reasonable rate. Gradually the city is growing up around and encroaching upon the limits proposed, and measures should be taken at once to effect the purchase. A distinguished senator remarked in reference to the inauguration of a public park that "there is no expenditure that can be made which shall add to the grandeur and adornment of the public buildings that fill so largely the eye of admiration of the world, or of the vast libraries that are now accumulating so rapidly the treasures of all languages within your reach, or of the conservatories, and gardens, and cabinets that minister to your tastes, that will not freely be sanctioned by the people; for such in itself is the establishment of a nation's university, whither all may come to wonder and to learn, and in which all may feel a rightful public pride. A public park should be inaugurated that shall have no rival anywhere for beauty, or extent, or ornamentation, as it will have none for the illustrious characters gathered from a whole continent in the after time to wisely rule our republic from this centre of power. Let us profit by the accumulated experience of so many metropolitan cities, and so many great nations, and secure, while we may, here at the city of Washington, ample scope for a national park worthy of our people and our country."

In all the contemplated improvements of the public grounds of the capital, one very ornamental, as well as sanitary, feature should not be forgotten—the free introduction of water, as *jets d'eau*, fountains, miniature lakes into each and all of them, will greatly enhance their charms by refreshing and cooling the heated atmosphere of summer, and by the preservation in all their natural beauty of the various shrubs and trees which adorn them. The abundant supply furnished from the Great Falls of the Potomac, by the Washington aqueduct, will be a never-failing source from which to obtain all that may be needed for such purposes. Groups of statuary should be artistically arranged throughout the grounds as another evidence of enlightened taste.

AVENUES AND STREETS.

But very limited appropriations were made for the last fiscal year to be expended upon the improvement of the avenues, 20 in number. Many

of these have been either entirely or partially opened, and many are quite impassable. Forming the most direct lines of communication between different and distant sections of the city, and between many of the public buildings and grounds, it is necessary that the grades should be established at once, and that the roadways be placed in good travelling condition. This should be done in justice to the holders of property, as well as for the public convenience. Virginia avenue has been graded and gravelled for several squares, but work was suspended in consequence of no money having been appropriated to continue it. This is one of the finest streets in the city, and the advantages of opening it to travel have already been experienced. The large amount of marketing brought over the Navy Yard bridge is now diverted from the old and long frequented thoroughfare of Pennsylvania avenue, east of the Capitol, and finds more direct access to the different emporiums of trade. In the event of the building of a more ornamental and permanent bridge across the Eastern branch, the terminus of this avenue may be probably selected for the new site; the river is at that point of less breadth than at the locality of the present pile one, and the avenue will make a grand approach. A great deal of the traffic will be directed from Benning's bridge, and, in fact, one substantial structure will answer the purposes of the two existing ones.

Since the removal of the workshops used in the extension of the Capitol, New Jersey avenue, to the south of the building, presents an improved appearance.

Maryland avenue, one of those most constantly used, leads northerly in the direction of Benning's bridge. Immediately in the vicinity of the Capitol it has been graded and gravelled, but still a large amount of work is required to place it in good repair as far as the city limits. At times it is almost impassable. In that portion towards the Long bridge it constantly needs repairs.

The impossibility at present of using Delaware avenue has already been noticed.

Vermont avenue is a fine broad one leading direct from the President's house to the environs of the city, and should be opened its entire length. Its position makes it one of the grandest streets of the city. Connecticut avenue starts from the same centre, and is in a direct line to those beautiful grounds along Rock creek which have been selected for a national park. When opened and repaired throughout it will be one of the finest drives in the direction of that proposed public improvement. The reservations along it should be enclosed and adorned. An act to incorporate the Connecticut Avenue and Park Railway Company has already become a law.

New York avenue, to the west of the Navy Department, has been partially opened, and the corporation are now engaged in grading and paving north E street, leading from it along the front of the Observatory grounds; this will very materially improve that part of the city.

Massachusetts avenue should be made one the most magnificent ones in the metropolis. It extends from Boundary street, near the Paper Mill bridge across Rock creek, to the public grounds occupied by the government powder magazines, on the banks of the Eastern branch, and is very nearly parallel to the main thoroughfare, Pennsylvania avenue. Some very little work was executed towards opening it, at several places, to the travelling public. For many years it had remained closed; houses, gardens, brick-kilns, and other obstructions preventing it from being used. It is one of the most direct lines of communication between a large section of the city of Washington and a great portion of Georgetown. To

make it more perfect some one of the streets, Dunbarton, Beale, or West street, in the latter city, should be opened to the banks of the creek in the prolongation of either N, O, or P streets of the capital, the connection between them being formed by a substantial arched bridge. As the creek is not very wide, and the banks high, very heavy embankments would not be required to diminish the span over it. This would not only prove a great benefit to those residing in the immediate neighborhood, but would be an immeasurable advantage to all the citizens of both places. A considerable portion of the travel would be diverted from the Aqueduct bridge, uniting Pennsylvania avenue with Bridge street, and relieve that structure from being, as at present, the great highway for the heaviest traffic.

There are many other avenues that require attention on the part of the government; Boundary street, towards which many of them lead, forms a connecting link between them, and skirts the environs of the city. It is capable of great embellishment; by increasing the width and planting along it rows of shade trees, it will become a most delightful and much frequented drive. The labor for a great amount of the work accomplished was paid out of the appropriation made by Congress to aid in supporting the indigent and poor of the city, and the plan succeeded most admirably; those who were destitute and deserving obtained work, and kept them from distress and want. Instead of appropriating money for their immediate care, save in extreme cases, it would perhaps be better policy to inaugurate improvements, so as to enable them to obtain labor and gain their own support. In my last annual report, to which reference is again made, it was stated that the oldest and greatest thoroughfare from one limit of the capital to the opposite one, connecting the most important buildings and grounds, is Pennsylvania avenue; a glance at the map shows that it is the most central one. In consideration of the great importance of this avenue, the relative position it bears to all the avenues and streets, which either diverge from it in every direction or intersect it along its entire length, some most marked improvements should be inaugurated to render it as great and beautiful in appearance as it has proved to be necessary and accessible. The very limited appropriations of the last fiscal year enabled me to make only such repairs as were most needed; some sections had become almost impassable from the effects of weather, and from having been badly cut up by the immense amount of travel over them. It is now only in tolerable condition. Congress failed to make any appropriation at all for keeping this avenue in order during the present fiscal year; from the charity fund previously referred to, a force was employed to give it one thorough cleaning, and since then the services of one man, with a horse, cart and driver, is all the labor employed to keep it in a somewhat cleanly state; he not only has to sweep the roadway and repair the holes along it, but also to clean the sewer traps. Is it to be marveled then that its condition is no better? The seat of government of a nation should be able to boast of one magnificent avenue, at least; that part extending from Rock creek, its terminus on the west, to that splendid pile of architecture, the Capitol, should receive the advantages of the most improved roadway. There is scarcely a street or avenue in the city over which one can drive with ease and comfort; it is only lately that the bluestone pavement has been laid to any extent, and the agreeable contrast experienced between it and that of the old-fashioned cobblestone cannot but be appreciated by all. The streets of a city are public property, in which all citizens are more or less interested, and in point of necessity no other public work can equal them. Why, then, is not more attention paid to paving

and ornamenting them? In view of the importance of having, at least, one good pavement traversing the city, the recommendation is made that the present one be removed, and that the avenue be laid with either one or the other improved ones now coming into general use. If stone is to be used, the Belgian pavement possesses the greatest advantage; but should one of wood be preferred, which is delightful, easy and not noisy, either the Nicholson, Ream, Fayette, Stafford, or Stowe will prove to be as near perfection as it is possible to construct them. Then, again, the asphaltum, the concrete, and other similar ones have their advantages. These should all be subjected to the severest competitive examinations.

The length of that part of the avenue which it is proposed to improve is over two and a half miles, and averaging in superficial measurement about 150,000 square yards. Although the nation at large is deeply interested in the general improvement of the metropolis of the republic, and especially in the accomplishment of such a great and much needed work, still the property holders along the avenue, as well as the citizens generally, are mostly benefitted by it; the expense might, therefore, be equitably proportioned between the municipal and general governments. Many citizens have petitioned Congress to pave Louisiana and Indiana avenues leading to the railroad depot from Pennsylvania avenue. In addition to laying a good carriage way, other advantageous changes might be introduced for the beautifying of the broad avenues and streets. Some sketches exhibiting different plans of improvement and adornment, one or two of them taken from those employed in several of the large cities of Europe, will accompany this report, and give an idea of what can be done in the way of ornamentation. By an act making appropriations and to supply deficiencies in the appropriations, approved July 25, 1868, it was provided "that section 15 of an act entitled 'An act to incorporate the city of Washington,' passed May 15, 1820, and section three of an act approved May 5, 1864, entitled 'An act to amend an act to incorporate the inhabitants of the city of Washington,' passed May 15, 1820, are hereby repealed; and no improvement of the streets, alleys, avenues, or other property of the United States in the city of Washington, authorized by said act, which is to be paid for by the United States, shall hereafter be made until an appropriation shall have been made therefor, and such appropriation, when made, shall be expended under the direction of the chief engineer of the army." An appropriation having been made for the purpose of paying for such improvements as have already been made, the greater part of the indebtedness of the government has been met. As it is contemplated to continue them and inaugurate new ones during the coming year, it is important that provision be made in advance to have ready in the hands of the officer in charge sufficient funds to pay the government's proportionate part. Before closing the subject of avenues and streets your attention is respectfully called to the improvements suggested by the completion of the north wing of the Treasury Department. It is to be regretted that the site of that building is so low, and that in consequence the fine effect of the elegant front on the north is considerably impaired. It has been recommended by the supervising architect, in order to overcome the difficulty of situation, that either a strip of land of 61 feet in width on the east side of Fifteenth street, between New York and Pennsylvania avenues, be condemned, and the street removed a corresponding distance from the building, or that the grades of Fifteenth street and that portion of the avenue on the north, between Fifteenth street and the centre of the President's house, be reduced. The surroundings of this mag-

nificent building should be as extensive and beautiful as possible, and the expense of rendering them so will be small in comparison with the cost of its construction. Similar remarks are applicable to the streets encompassing the Patent Office building and the Post Office Department. Seventh street should receive a gradual and easy grade between the northeast angle of the first named building and Pennsylvania avenue, and the grade of F street, lying between the two, be made to correspond between Ninth and Sixth streets, and also that of Eighth between F and the avenue. At present the buildings are scarcely visible from this main thoroughfare. Other improvements are needed, but a description of the details would require too much space.

WASHINGTON CANAL.

Since the date of my last report this canal has remained in the same, if not reduced to a still more filthy, pestilent condition; no efforts have been made by either the government or the corporation to better it. What was then written is still applicable; it is a great nuisance in its present state, and extremely disgusting to both sight and smell. It is nothing more than an open sewer, constantly generating noxious gases, which are most deleterious to those not only residing immediately along its banks, but to the inhabitants of the entire city. Let it be either converted into a veritable canal, or arched over and used entirely as a sewer. Either would be a sanitary improvement. Whether the government, the corporation, or private enterprise undertake the work, it should be done without further delay; the health of the city would not only be benefited, but the value of property in its neighborhood would be greatly enhanced. What a great advantage it would be to the Mall, as the approaches from a very large section of the city lead over the canal to the public grounds.

TIBER CREEK.

This creek, with its branches, drains a very considerable extent of land without the city limits as well as a large part of the city itself. A great accumulation of sand, gravel, and many very deleterious substances are washed down and deposited in the bed of the stream. Some action should be taken to arch it over from where it crosses Pennsylvania avenue to the extreme northern limits of the corporation. In addition some system of gravel pits and drains, for collecting the washings of the soil, should be arranged at different points; if not arched over the banks should be protected by sodding or masonry. The management of the Tiber must be treated in the light of a main sewer for a large and growing section of the city, and all improvements projected with that object in view. A bill has been introduced into Congress to arch over the creek. During the last session a small appropriation was made for an arched roadway to cross it on North Capitol street, provided the corporation will furnish the balance of the amount necessary to build it.

MARKETS.

Attention is again called to the condition of the Centre market on Pennsylvania avenue; the dilapidated and unsightly buildings not only still exist, but additions are being made to them; new stalls are being constructed across Eighth street, entirely obstructing it and altogether

shutting out the view of the Smithsonian grounds. A joint resolution of Congress, approved January 30, 1864, prevents the erection of any permanent building upon any property reserved to, or for the use of, the United States, and an injunction was issued to stop work upon a structure then going up for market purposes. A bill was introduced into the Senate, and passsed by that body at its last session, providing for the removal of the Centre market, and for the erection of a market building in a more suitable locality; strong opposition was made to the passage of the bill in the House by those interested in retaining it on its present site. It is not only a reflection upon the good taste of the community that such an old and objectionable structure should be allowed to stand upon the principal avenue of the capital, but it is a disgrace to see this main artery, connecting the Capitol with most of the public buildings, obstructed by such a diversified and by no means pleasing collection of commodities as are usually offered for sale on every market day. Cannot a more suitable locality be found and one equally convenient of access? And cannot an ornamental, as well as a commodious market be erected, which will be a credit to the city? If the corporation does not take the necessary steps to remove the cause of this great nuisance by erecting a suitable and imposing structure, the government should resume control of the reservation for the purpose of improvement.

POTOMAC RIVER FRONT.

Several applications have been made for permits to construct wharves along the river front. It seems a disputed point whether the government, the corporation, or the heirs and assignees of the original proprietors of the land upon which the city stands, have the right to grant or sell the privilege. A legal decision should be had in the case, as it is a most important question, and in the event of any permanent improvements being made to the city channel will become more so. A bill has been introduced in the Senate to incorporate the Potomac Navigation and Transportation Company of the District of Columbia, in which it is to be enacted that the corporation is authorized to purchase and hold lands, and may locate and construct wharves, docks, and railways, into the Potomac river and in front of Mason's island, so as not to interfere with the navigation of the river. As such important operations are contemplated, it is necessary that all questions of law be settled.

PUBLIC BUILDINGS.

The extension of the Capitol and the repairs of the centre building, and also the completion of the Patent Office building, are under the charge of the architect, Mr. Edward Clark: the General Post Office building is under the control of the disbursing clerk of the department, Mr. E. B. Olmstead; the Treasury extension is being built under the superintendence of the supervising architect of the Treasury Department, Mr. A. B. Mullett; the War and Navy buildings, and the building at the corner of F and Seventeenth streets, are in the care of some one of the officials attached to one or the other of the departments or bureaus. There is a very great number of private buildings rented for government purposes.

PRESIDENT'S HOUSE.

Several very important renovations and repairs were attended to during the last fiscal year, and the main building and stables are now in very

good order. A few rooms still require to be painted and papered, and some of the furniture and carpeting to be renewed. The exterior walls and colonnades require to be repainted. The conservatory attached to it has been almost entirely rebuilt, and plants are being purchased to replace those destroyed by fire. The small appropriation for this building is entirely inadequate to keep it in as complete order as it should be, and to preserve and supply all the needful appendages to a mansion intended for the residence of the Chief Magistrate of the nation. A larger appropriation is asked for annual repairs for the next fiscal year, and also one for refurnishing the establishment at the commencement of the next presidential term. As this city has become the permanent seat of the government, where millions have been expended upon the public buildings, and the improvement and ornamentation of the grounds, it would seem proper that each State should build and furnish suitable houses for its senators and representatives. The necessary appropriations could easily be made, and would prove not to be bad investments. Those benefited would be made more comfortable, and be able to receive and entertain their constituents and friends; the city would be improved by the addition of highly embellished houses, and more apparent stability would be given to the capital. Foreign nations would be induced to emulate the example, as it would then appear that each State individually had some permanent and active interest and influence over the municipal affairs of the city. Attention is again called to my last annual report in reference to the selection of a site for a new Presidential Mansion.

WASHINGTON AQUEDUCT.

The annual report, which is herewith appended, of the superintending engineer of the Washington aqueduct, furnishes in detail a statement of the operations on that work during the last fiscal year. The foundation and superstructure masonry of the dam at the Great Falls of the Potomac were completed, and the gate-house at the same place is nearly finished. The stone bridges are still left in the same incomplete condition; there being no parapets or railings to them it is considered very dangerous to cross them. The conduit extending from the gate-house at the Great Falls to the distributing reservoir has been in very good order, considering that the road over it has become a great highway for the farmers living along the line of it; many country roads also lead into it. As it has become in such general use it should be macadamized; the soil being of clay is easily cut through in wet weather to the crown of the arch. Since the completion of the connecting conduit around the receiving reservoir, the supply of water comes direct from the Potomac without mingling with that of any other stream; the reservoir is now used only for the storage of water to meet any emergency that may arise.

The distributing reservoir should be deepened as soon as possible to enable the water to settle before reaching the city, and to enable it to hold a larger quantity in store in the event of accidents. The embankments have been greatly damaged by the washing of the waves caused by high winds, and should be repaired without delay, and lined with stone laid in cement. The high service reservoir is still left in an incomplete state. It would be a great improvement to remove the unfinished dome intended to cover it, and enclose it by a neat iron railing. It was built in order to furnish a supply of water to Georgetown heights, a part of the city too high to be served direct from the main pipes; the water is forced into it by a Worthington water pressure engine, located in the west abutment of the aqueduct bridge across Rock creek. There has

been constant complaint that the residents on the heights are not sufficiently supplied with water, but from a thorough examination and trial it is evident that there is more than enough for all practical purposes, and that the consumption, nearly 200,000 gallons, being forced up daily, must be attributed to wastefulness. The adoption of meters in all dwellings and mills is recommended by the engineer. The iron bridges have recently been painted and repaired in every particular, and are in excellent order. The pipe line, which is a continuation of the conduit, extends from the distributing reservoir to the navy yard; it has required very little repair. It is again earnestly recommended that new fire-plugs should replace the old ones on Pennsylvania avenue, and that they be connected directly with the 12-inch main along it. At present the steam engines have to obtain their supply from other streets. The cost of erecting new ones will be very small. Considering that there are but few thoroughly fire-proof buildings belonging to the government, that millions of dollars of public property are distributed throughout the city, and that immensely valuable papers are stowed away in most unsafe offices, every precaution should be taken to prevent their destruction. My attention has been frequently called to this matter. The archives belonging to the War Department, especially to the Adjutant General's and Paymaster General's offices, are particularly valuable, and in their safety and preservation almost every family in the land is interested. The pipes for increasing the supply of water in the Capitol building were laid last year, and work has been commenced in placing others along North B street and First street east, which will make complete the connection between the terminus of the 30-inch main on New Jersey avenue with the 12 inch main on Capitol hill. This will partly remedy the deficiency of water in the eastern portion of the city. To meet the demands of the constantly increasing growth of the northern part of the city another large main will have to be introduced into that section from the distributing reservoir. The engineer reports that the supply of water has been uninterrupted, and the consumption has exceeded 12,000,000 of gallons per day, a large amount of which has been expended by the government buildings, workshops, and fountains. As stated in my last report certain tracts of land are occupied by the government for aqueduct purposes, for which, in some cases, only nominal rents are paid; in others no rents have been paid at all, and claims are now being made by the owners to become either repossessed of their property or to be paid for its use. As the United States must retain the few acres for the benefit of this national work, it is earnestly urged that the necessary appropriations be made to purchase them. But a few thousand dollars is needed to meet all the claims and to buy the land. The great importance of introducing into the capital an unlimited supply of pure and wholesome water cannot be overestimated. The water thus furnished has become a great motive power at the different government workshops and buildings throughout the city, and when the capital of the nation becomes what every enlightened citizen desires to see it, a still larger demand will be made for both useful and ornamental purposes. Including the estimates submitted for completing the Washington aqueduct, the total cost of the work will not exceed $4,000,000. The following tables show some very interesting data in regard to what should be considered the greatest improvement for the benefit of the city of Washington.

Table of distances by the aqueduct from gate-house at Great Falls to navy yard and intermediate points.

	From Great Falls.	From navy yard.	Intermediate points.		From Great Falls.	From navy yard.	Intermediate points.
	Miles.	*Miles.*	*Miles.*		*Miles.*	*Miles.*	*Miles.*
Great Falls gate-house	.....	18.59	.....	Wooden bridge rec'g res'r	9.40	9.19	0.55
Waste weir No. 1	0.36	18.23	0.36	Gate-house rec'g reservoir	9.79	8.89	0.30
Over-fall No 1	0.59	18.00	0.23	Waste weir No. 3	11.11	7.44	1.45
Bridge No. 1	1.27	17.32	0.68	Influent gate-house	11.56	7.03	0.41
Bridge No. 2	1.46	17.13	0.19	Pipe-vault distributing reservoir	12.02	6.57	0.46
Junction road	1.94	16.65	0.48	Foundry branch	12.65	5.94	0.63
Road at Radcliffe's	3.22	15.37	1.28	College Pond bridge	12.91	5.68	0.26
Culvert No. 12	4.32	14.27	1.10	Rock Creek bridge	13.94	4.65	1.03
Bridge No. 3	5.00	13.59	0.68	East front of Capitol	16.81	1.78	2.87
Bridge No. 4	6.26	12.33	1.26	Navy yard	18.59	.....	1.78
Brook's road	8.85	9.74	2.59				

Number and length of tunnels.

Tunnel No. 1	1,438 feet.
Tunnel No. 2	3,865 feet.
Tunnel No. 3	86 feet.
Tunnel No. 4	766 feet.
Tunnel No. 5	90 feet.
Tunnel No. 6	88 feet.
Tunnel No. 7	679.5 ft.
Tunnel No. 8	421.9 ft.
Tunnel No. 9	725 feet.
Tunnel No. 10	86 feet.
Tunnel No. 11	626 feet.
Tunnel No. 12, Dalecarlia	890 feet.

Grades.

Feeder entrance	146.50
Manhole 11, near junction	145.10
Bridge No. 3	142.54
Bridge No. 4	141.54
Guard-gate	139.27
Invert	132.27
Crown intrados	143.80
Effluent receiving reservoir	138.38
Influent distributing reservoir	137.37

Descent, 9½ inches per mile.
Diameter of conduit, 9 feet.

Number and span of bridges.

Bridge No. 1	14 feet cut stone.
Bridge No. 2	10 feet cut stone.
Bridge No. 3	75 feet cut stone
Bridge No. 4	220 feet cut stone.
Bridge No. 5	120 feet iron pipes.
Bridge No. 6	200 feet iron pipes.

Cost of stone bridges.

Bridge No. 1	$4,006
Bridge No. 2	7,779
Bridge No. 3	76,068
Bridge No. 4	237,000

Area of reservoirs.

Receiving reservoir	53 acres.
Distributing reservoir	44 acres.
High service reservoir	120 feet diameter.

Pipe and culverts.

Length of pipe-line	18 miles
Number of culverts	26

As an inducement to obtain experienced and reliable persons, compensation commensurate with their services should be afforded them. The pay of the clerk, whose duties are very arduous, should be certainly increased. The assistants on the different works connected with the office of Public Buildings, Grounds, and Works, all deserve great credit for the manner in which they have severally performed their duties and carried out my instructions.

I am, general, very respectfully, your obedient servant,

N. MICHLER,
Major of Engineers, Brt. Brig. Gen. U. S. A.

Brevet Major General A. A. HUMPHREYS,
Chief of Engineers United States Army,
Headquarters Corps of Engineers, Washington, D. C.

Sketch showing Plan for the Improvement of Streets & Avenues in the City OF WASHINGTON.

Paved | Paved | Gravelled | Gravelled | Paved

FROM AVENUE UNTER DEN LINDEN, BERLIN, 210' WIDE.
reduced to 160'

12' | 28' | 2' | 18' | 40' | 18' | 2' | 28' | 12'

Accompanying Report of N. Michler, Maj of Engrs & Brig. Gen'l U.S.A. dated Sept. 30th 1868.

Sketch showing Plan for the Improvement of Streets & Avenues in the City OF WASHINGTON.

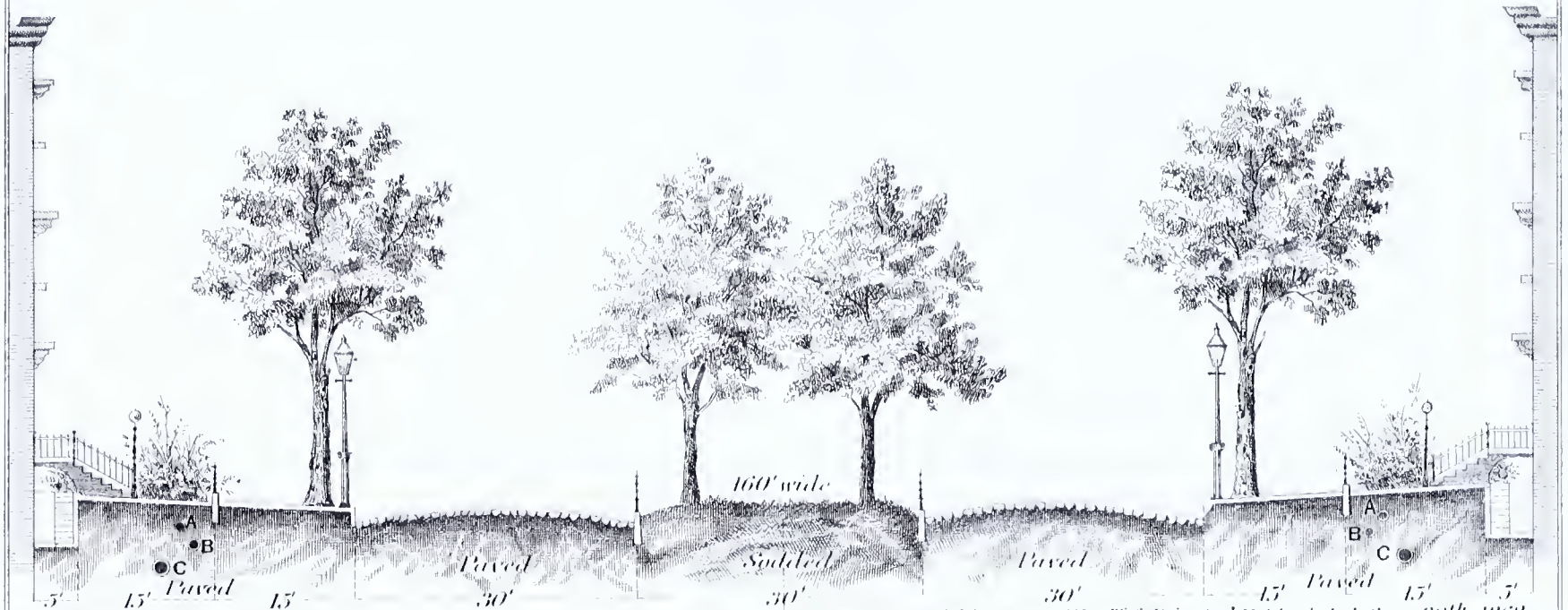
A: Gas; B: Water; C: Sewer.

Accompanying Report of N. Michler, Maj. of Eng^rs & Brig. Gen^l U.S.A. dated September 30^th, 1868.

SKETCH showing Plan for the Improvement of Streets and Avenues in the City of WASHINGTON

Proposed by

Randolph Coyle, Esq:

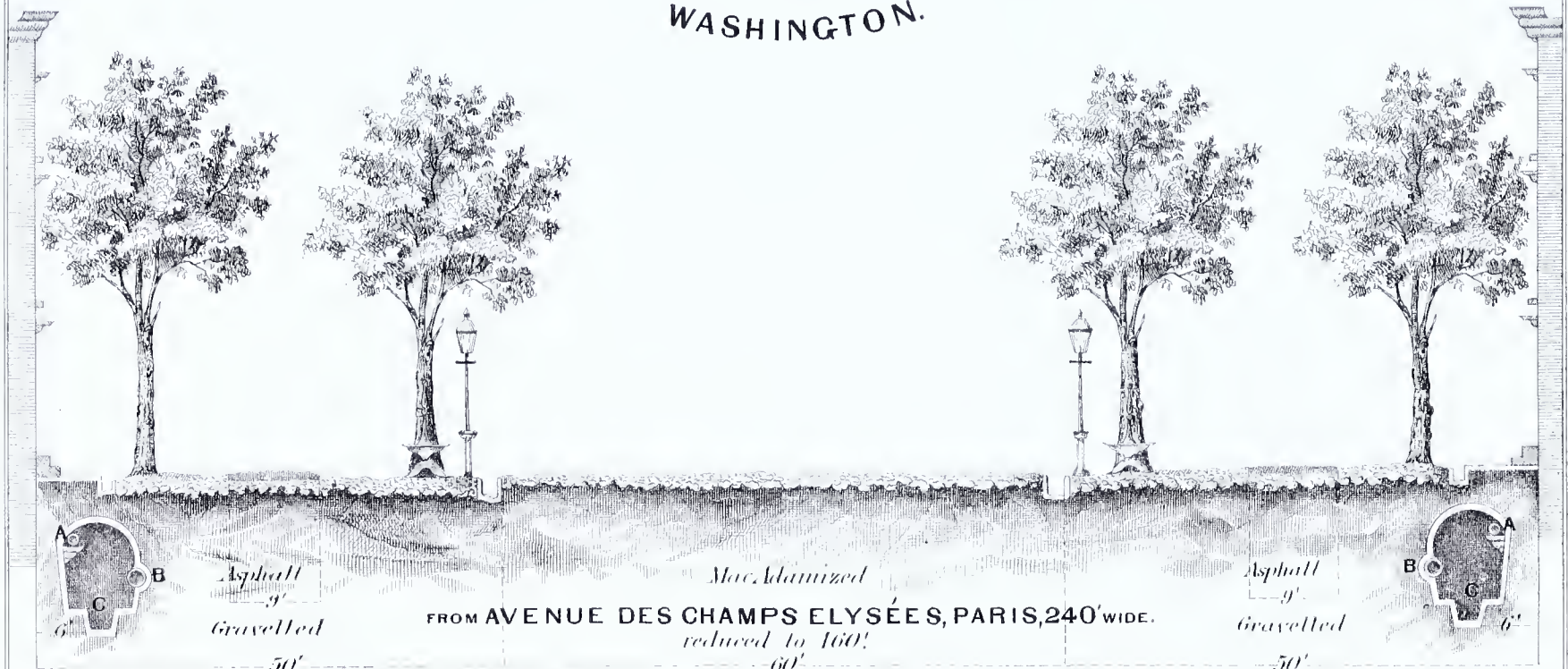


Accompanying Report of N. Michler, Maj. of Eng.rs & Brig Gen.l U.S.A., dated Sept. 30th 1868.

Sketch showing Plan for the Improvement of Streets and Avenues in the City

OF

WASHINGTON.



FROM AVENUE DES CHAMPS ELYSÉES, PARIS, 240' WIDE.
reduced to 160!

A: *Gas;* B: *Water;* C: *Sewer.*

Accompanying Report of N. Michler, Maj. of Engrs & Brvt. Gen.l U.S.A. dated Sep.t 30th 1868.

Accompanying Report of N. Michler, Maj. of Engrs & Brig. Gen.l U. S. A., dated Sept. 30th 1868.

OFFICE OF THE WASHINGTON AQUEDUCT,
Washington, D. C., October 1, 1868.

GENERAL: I have the honor to submit the annual report of the operations of this office for the year ending September 30, 1868, arranged under the different heads that were adopted in the last annual report, as follows:

POTOMAC DAM.

The foundation and superstructure masonry and the back filling of this structure from the Maryland shore to Conn's island were fully finished by the beginning of last December, to a height of 147 feet above the datum line of the Washington aqueduct, affording during the lowest stages of water in the river a depth of five feet at the head of the conduit. A thorough examination recently made of the masonry shows that it has not sustained any damage by the freshets of the Potomac, which last spring were unusually heavy. The large dead tree left by the flood on the bulk-head on Conn's island shows that the water was over 10 feet deep on the crown of the dam.

The pond above the dam extends to the upper end of Conn's island; it contains a great many rocks, trees and bushes which should be removed, as the roots, branches and leaves decay and affect the purity of the water.

The temporary dam was nearly all washed away; it had been kept in repair since 1863, and was a constant source of trouble and expense. It is gratifying to be able to report that it can now be dispensed with.

GATE-HOUSE AT GREAT FALLS.

This building is nearly completed; the roof is ready for the slates, and arrangements are being made for removing the decayed wooden floor and the timbers that support the gates, and replacing the same with flooring and girders of cast iron.

BRIDGES.

The stone bridges are all in an unfinished condition; the importance of completing them has been fully represented in preceding reports, but owing to the failure of Congress to made an appropriation for that purpose, no work has been done upon either of them since 1863.

THE CONDUIT.

The conduit, extending from the gate-house at Great Falls to the distributing reservoir, is generally in good condition. An unusually large amount of work has been done on the embankments, ditches, culverts, &c., which has been made necessary by the heavy rains that have fallen during the year; to a certain extent similar work will have to be done every year. The road over the conduit has become one of the principal highways of Montgomery county, and is extensively used by the farmers for bringing their produce to market; it should be all macadamized, for during wet weather, owing to the large amount of travel over it, it is difficult to keep it in good order.

The connecting conduit has been in constant use since August, 1867; the heavy rains which have fallen during the year, together with the freshets in Powder Mill Branch, damaged the slopes of the embankments; it is now in good condition; the slopes facing the reservoir should be pro-

tected with ripraps. Since August, 1867 the receiving reservoir has been used only for the storage of water, the water from the Potomac passing by it through the connecting conduit to the distributing reservoir.

DISTRIBUTING RESERVOIR.

The condition of this reservoir is similar to what it was at the date of the last annual report, only the embankments have been further damaged by the waves; the slope of the southeast embankment, originally built with two feet of base to each foot in height, is now perpendicular. In my opinion the water should be drawn off, and the reservoir not used again until it is completed. The necessity of deepening and finishing the distributing reservoir has been fully shown in preceding reports; especially in the supplemental report dated February 22, 1864, to which I respectfully refer.

HIGH-SERVICE RESERVOIR.

No appropriation was made for finishing this reservoir; consequently it is in the same condition that it was at the date of the last annual report. It has been in constant use for supplying that part of Georgetown heights which is too high to be supplied by the distributing reservoir. The water is forced into it by the Worthington water-pressure engine located in the west abutment of bridge No. 6. This engine has been in almost perpetual motion during the year; it has been stopped but a few times for repairs, and has forced to the heights over 190,000 gallons of water daily. This amount has not been sufficient for the inhabitants of the heights, and the supply stored in the high-service reservoir has been materially reduced. On the first of May the surface of the water was 218 feet above datum; to-day it is only 208 feet.

I am convinced that much of the consumption is to be attributed to wastefulness, which might be prevented by attaching a meter to the pipes in each house where the water is taken, at the expense of the occupants, and a water rate established by the Georgetown water board. The consumption would then be reduced, and the supply would be abundant for all.

IRON BRIDGES.

The iron bridges are in good condition. New sidewalks have been built on Rock Creek bridge, and the masonry of the abutments has been repointed with cement. The floor will probably last for another year.

PIPE LINE.

The pipe line extending from the distributing reservoir to the navy yard is in good condition. During the year very few leaks have occurred; the water has been shut off only to make additional connections. Last year a 20-inch main was laid in North B street from the terminus of the 30-inch main to Delaware avenue, and a 12-inch main from this point to the eastern front of the Capitol. The 20-inch main is being continued in North B street to First street east, where it will be connected by a 12-inch main with the 12-inch main in A street north. The pipes are all delivered, and the work will be finished in a few weeks.

CONSUMPTION OF WATER.

The supply of water has been uninterrupted, and the consumption has exceeded twelve millions of gallons per day, a large amount of which has been consumed by the government buildings, fountains, and navy yard.

LANDS.

The following described parcels of land, to which the United States have no title, are occupied for the use of the Washington aqueduct:

At Great Falls, $5\frac{44}{100}$ acres of land belonging to the estate of the late Hall Neilson. In Montgomery county, the road across the farms of Jackson, Collins, and Anderson, and the road across the farm of William Brooke. In Georgetown, at the high-service reservoir, a lot of land fronting on High street and partly covered by the reservoir embankment, the property of Mrs. E. M. Mosher. In Georgetown, at bridge No. 6, a lot of land fronting on Montgomery street; on it are located the office, pipe yard, and workshops of the Washington aqueduct. This lot is the property of Mrs. Maria C. French, and has been occupied by the United States over eight years; no rent has been paid for the use of it; the taxes have been paid by Mrs. French, and this year they amount to $150. An appropriation should be made for the rent and purchase of each of the above described parcels of land, as they will always be required for the use of the aqueduct.

FINANCIAL STATEMENT:

At the date of the last annual report the balance in the treasury applicable to this work was	$23,544 56
Appropriated by Congress July, 1868, for deficiency in construction of the connecting conduit, Potomac dam, gate-house at Great Falls, and temporary dam	27,500 00
Appropriated by Congress July, 1868, for salary of assistant engineer, superintendence and repairs for the year ending June 30, 1869	25,000 00
Received from corporation of Georgetown for expenses incurred in supplying high-service reservoir with water during repairs to engine at bridge No. 6	137 00
	76,181 56

The expenditures to date are as follows:

For construction of connecting conduit	$23,558 38
For construction of Potomac dam	2,963 61
For construction of gate-house at Great Falls	1,627 20
For engineering, superintendence and repairs	15,608 31
For office expenses, internal revenue, gas, fuel and stationery	346 18
Balance	32,077 88
Total	76,181 56

Summary of appropriations made by Congress for the Washington aqueduct.

April 30, 1852	$5,000 00
March 3, 1853	100,000 00
March 3, 1855	250,000 00
August 18, 1856	250,000 00
March 3, 1857	1,000,000 00

June 12, 1858	$800,000 00
June 25, 1860	500,000 00
July 4, 1864	150,000 00
July 28, 1866	142,584 00
December 20, 1866	12,000 00
March 2, 1867	20,000 00
July, 1868	52,500 00
Total	3,281,584 00

Estimate of the cost of completing the Washington aqueduct.

For rent and purchase of $5\frac{44}{100}$ acres of land at Great Falls	$1,320 00
For purchase of road way from Great Falls to conduit road, $2\frac{3}{10}$ miles—$18\frac{4}{10}$ acres	1,012 00
For purchase of road way across land owned by William Brooke	550 00
For rent and purchase of land at high-service reservoir	3,300 00
For rent and purchase of land at bridge No. 6	2,640 00
For excavating rocks and removing trees and bushes above dam at Great Falls	5,500 00
For lining and repairing tunnel No. 1	1,650 00
For completing stone bridges	27,500 00
For increasing embankment over conduit and macadamizing roads	11,000 00
For lining 350 feet of connecting conduit tunnel	15 400 00
For excavating the bottom of the distributing reservoir to an additional depth of 13 feet, and lining the interior slopes with rubble masonry laid in cement	411,115 00
For completing gate-houses at distributing reservoir	44,538 00
For 30-inch pipe from distributing reservoir pipe vault to Foundry Branch pipe vault	78,633 00
For completing high-service reservoir	8,800 00
For riprapping water face of connecting conduit	11,000 00
For ventilators over conduit	3,080 00
For fencing conduit and reservoirs	21,000 00
For building office at bridge No. 6	3,300 00
For engineering, superintendence and repairs for the year ending June 30, 1870	33,000 00
	685,338 00
If to the above be added the amount of former appropriations	3,281,584 00
The total will be	3,966,922 00

I am, general, very respectfully, your obedient servant,

THEODORE B. SAMO,
Chief Engineer.

Brevet Brigadier General N. MICHLER,
Major of Engineers U. S. Army, in charge.

Estimate of amount required to be appropriated for public buildings, grounds, and works; and for continuing the construction of the Washington aqueduct, and for superrision and repair of the existing portion of the same, under direction of the Chief Engineer of the army, for the fiscal year commencing July 1, 1869, and ending June 30, 1870.

Head or title of appropriation.	Reference to law by which last appropriation was made.				Estimate of appropriation required for the fiscal year ending June 30, 1870.	Estimate of balances of appropriations unexpended on the 30th of June, 1869, which may be applied to service of next fiscal year.	Appropriations for the fiscal year ending on the 30th of June, 1869.
	Date.	Vol.	Page.	Sec.			
For repairs, care, and improvements of public buildings and grounds, per estimate in detail herewith marked A.	.....	.....	.....	.....	.....	.....	$526,000 00
For compensation of persons employed in and about the public buildings and grounds, per statement in detail herewith marked B.	.....	.....	.....	.....	.....	.....	51,430 00
For continuing the construction of the Washington aqueduct, and for the supervision and repair of the existing portions of the same, per estimate in detail herewith marked C.	.....	.....	.....	.....	.....	.....	685,338 00
For improvement of the Virginia or Georgetown and Washington channels of the Potomac river, in the District of Columbia, per statement in detail herewith marked D.	.....	.....	.....	.....	.....	.....	138,000 00
Total	.....	.....	.....	.....	.....	.....	1,400,768 00

A.—*Statement in detail of amount required for repairs and improvements of the public buildings and grounds at Washington City, D. C., under the direction of the Chief Engineer of the army.*

Object of appropriation.	Reference to laws by which the last appropriation was made.				Amount required to be appropriated.
	Date.	Vol.	Page.	Sec.	
For casual repairs of the navy yard and upper bridges	July 20, 1868	Pam.	8	.....	$5,000 00
For repairs and taking care of the bridge at or near the Little Falls of the Potomac river	July 20, 1868	Pam.	8	.....	2,000 00
For repairs of the Long bridge across the Potomac river	July 20, 1868	Pam.	8	.....	5,000 00
For fuel for the President's house	July 20, 1868	Pam.	8	.....	5,000 00
For repairs of Pennsylvania avenue, including cleaning and repairing sewer traps, new crossings, &c.	Mar. 2, 1867	Pam.	462	1	20,000 00
For improvement and taking care of public reservation No. 2 and Lafayette square	July 20, 1868	Pam.	8	.....	10,000 00
For taking care of and improving grounds south of the President's house	July 20, 1868	Pam.	8	.....	10,000 00
For removing snow and ice from pavements and public walks.	July 20, 1868	Pam	8	.....	1,000 00
For repair of water-pipes and replacing fire-plugs along Pennsylvania avenue	July 20, 1868	Pam.	8	.....	10,000 00
For manure, and cartage for the same, for the public grounds and reservations	July 20, 1868	Pam.	8	.....	3,000 00
For further improvement and care of reservations on New York, Pennsylvania, Massachusetts, Connecticut, Vermont, and Maryland avenues	July 20, 1868	Pam.	8	.....	15,000 00
For painting iron fences around the public squares and reservations	July 20, 1868	Pam.	8	.....	3,000 00
For annual repairs of the President's house	July 20, 1868	Pam.	8	.....	10,000 00
For flower-pots, glasses, twine, &c	July 20, 1868	Pam.	8	.....	1,000 00
For fuel for the centre building of the Capitol	July 20, 1868	Pam	8	.....	1,500 00
For continuing the grading of Virginia avenue	Mar. 2, 1867	Pam.	463	1	20,000 00
For completing the iron fence around the botanic garden and and adjoining avenues	July 28, 1866	Pam.	314	1	29,000 00
For completing the improvement of Franklin square by enclosing it with an iron fence, planting trees, shrubbery, &c	July 28, 1866	Pam.	315	1	25,000 00
For the further improvement of Lincoln square	July 25, 1866	Pam.	251	1	10,000 00
For hire of carts on public grounds	Mar. 2, 1867	Pam.	462	1	3,000 00
For purchase and repair of tools used on the public grounds	Mar. 2, 1867	Pam.	462	1	1,500 00
For purchase of trees and tree boxes, to whitewash tree boxes, and repair pavements in front of reservations	Mar. 2, 1867	Pam.	462	1	5,000 00
For lighting the Capitol, President's house, and public grounds, the executive offices, &c	July 20, 1868	Pam.	8	.....	40,000 00
For pay of lamp-lighters, plumbing, gas-fitting, repairs, and cleaning, and material of all kinds	July 20, 1868	Pam.	8	.....	10,000 00
For purchase of stationery, books, maps, plans, office furniture, and contingents of the office	July 20, 1868	Pam.	8	.....	2,000 00
For completing iron fencing of the President's grounds on the south, and along the avenue now being opened between Fifteenth and Seventeenth streets, including gates, &c	.....	.....	.....	.....	27,000 00
For iron fencing of grounds south of the President's house along Fifteenth and Seventeenth streets to the canal, and along the canal, north side, between said streets, including gates, &c	.....	.....	.....	.....	40,000 00
For refurnishing the President's house at the commencement of the next presidential term	.....	.....	.....	.....	25,000 00
For improving Massachusetts, Connecticut, New York, Maryland, Delaware, and New Jersey avenues	.....	.....	.....	.....	50,000 00
For expenses to be incurred in the improvement of streets, avenues, and alleys in the city of Washington, passing by or through the property of the United States, and abating nuisances, to be expended under the chief of engineers	.....	.....	.....	.....	100,000 00
For an iron bridge across the canal at Sixth street west, 81 feet in length	.....	.....	.....	.....	10,000 00
For an iron bridge at Thirteenth st. west across the canal, leading to the Agricultural Department, having a span of 150 ft.	.....	.....	.....	.....	20,000 00
For improvement, care, protection, and repair of seats, fountains, &c., in the Capitol grounds, &c	.....	.....	.....	.....	2,000 00
For improvement of the monumental reservation about the Washington statue	.....	.....	.....	.....	5,000 00
Total	.....	.....	.....	.....	526,000 00

B.—*Statement in detail of compensation authorized by law to persons employed on the public buildings and grounds, under the direction of the Chief Engineer of the army.*

Designation of the office.	Reference to laws by which the compensation was authorized.				Am't per annum.
	Date.	Vol.	Page.	Sec.	
Clerk in office of public buildings	Aug. 31, 1852	10	91	1	$1,200 00
Messenger in office of public buildings	Mar. 3, 1859	11	421	1	1,000 00
Public gardener	Mar. 3, 1851	9	612	1	1,440 00
Laborer in charge of water-closets in the Capitol	Mar. 2, 1867	Pam.	456	1	720 00
Foreman in public grounds	Feb. 25, 1863	12	694	1	1,152 00
Twenty-one laborers in public grounds, at $864 per annum	Mar. 3, 1851	9	613	1	18,144 00
Four laborers in the Capitol, at $720 per annum	Mar. 3, 1863	12	750	4	2,880 00
Furnace keeper in the old hall of the House of Representatives	Feb. 25, 1863	12	694	1	864 00
Furnace keeper in the President's house	Aug. 18, 1856	11	117	1	720 00
Two policemen at the President's house	Mar. 2, 1867	Pam.	456	1	2,640 00
Two watchmen at the President's house	Mar. 2, 1867	Pam.	456	1	1,800 00
Doorkeeper at the President's house	Aug. 31, 1852	10	91	1	1,000 00
Assistant doorkeeper at the President's house	Aug. 31, 1852	10	91	1	600 00
Two draw-keepers at bridge across the Eastern Branch, fuel, oil, &c	Aug. 31, 1852	10	92	1	1,600 00
Watchmen at Franklin square	Feb. 28, 1866	Pam.	315	1	900 00
Person to take charge of heating apparatus for the Library of Congress	Mar. 2, 1867	Pam.	456	1	1,000 00
Electrician for the Capitol	Mar. 2, 1867	Pam.	463	1	1,200 00
Five watchmen at public reservation No. 2	Mar. 2, 1867	Pam.	456	1	5,000 00
Eight draw-keepers at Long bridge, fuel, oil, &c	Mar. 2. 1867	Pam.	456	1	7,570 00
Total					51,430 00

C.—*Estimate in detail of the cost of completing the Washington aqueduct, and for the supervision and repair of the existing portions of the same, for the fiscal year ending June* 30, 1870.

Object of the appropriation.	Reference to laws by which the appropriation was made.				Amount required to be appropriated.
	Date.	Vol.	Page.	Sec.	
For rent and purchase of 5 44-100 acres of land at Great Falls					$1,320 00
For purchase of roadway from Great Falls to conduit, 18.4 acres					1,012 00
For purchase of roadway across land owned by Wm. Brooke					550 00
For rent and purchase of land at high-service reservoir					3,300 00
For rent and purchase of land at bridge No. 6					2,640 00
For excavating rocks, trees, and bushes above dam at Great Falls					5,500 00
For lining and repairing tunnel No. 1					1,650 00
For completing stone bridges					27,500 00
For increasing embankment over conduit, and macadamizing roads					11,000 00
For lining 350 feet of connecting conduit tunnel					15,400 00
For riprapping water face of connecting conduit embankment					11,000 00
For excavating the bottom of the distributing reservoir to an additional depth of 13 feet, and lining the interior slopes with rubble masonry laid in cement					411,115 00
For completing gate-house at distributing reservoir					44,538 00
For completing high-service reservoir					8,800 00
For ventilators over conduit					3,080 00
For fencing conduit and reservoirs					22,000 00
For 30-inch pipe from distributing reservoir pipe vault to Foundry Branch pipe vault					78,633 00
For building office at bridge No. 6					3,300 00
For engineering, superintendence, and repairs for the year ending June 30, 1870	July 25, 1868	Pam.	4		33,000 00
Total					685,338 00

D.—*Statement in detail of the cost of improving the Virginia, or Georgetown and Washingt channels of the Potomac river.*

Object of the appropriation.	Reference to laws by which the appropriation was made.				Amount required to be appropriated.
	Date.	Vol.	Page.	Sec.	
For the removal of the causeway of the Long bridge, and to replace the same by a bridge upon piles	.....	.....	.....	.....	$25,000
For dredging the Virginia and Washington channels	.....	.....	.....	.....	8,000
For dredging a channel eight feet deep, and from two hundred and fifty (250) to three hundred (300) feet wide, between Easby's Point and the eastern draw of the Long bridge, about 300,000 cubic yards	.....	.....	.....	.....	105,000
Total	.....	.....	.....	.....	138,000

OFFICE OF PUBLIC BUILDINGS, GROUNDS, AND WORKS,
United States Capitol, Washington, April 30, 1868.

GENERAL: By section four of an act of Congress, approved March 2 1867, (Public No. 59,) "making appropriations for the repair, preserva tion, and completion of certain public works, heretofore commence under the authority of law, and for other purposes," the Secretary o War was directed to cause examinations or surveys, or both, to be mad of certain points, among others of the Potomac river, in the District o Columbia. Subsequently, by engineer orders No. 67, dated July 27 1867, the examination and surveys of the Potomac river were assigne to me. I now have the honor to submit a report of the same, accom panied by detailed maps of the different surveys made of that portio of the river lying between the aqueduct bridge, at Georgetown, an Giesboro' Point, including a part of the Eastern Branch. The last sur vey, in 1867, only extended from Easby's wharf, in Washington, nearl opposite the foot of Analostan or Mason's island, down to the Lon bridge; the improvements of the channels of this particular reach bein of most immediate and practical importance for the two cities. At you request, general, the Superintendent of the Coast Survey, Professor B Peirce, kindly consented to have the survey made. Captain C. P. Pat terson, hydrographic inspector, directed the operations, and the part in charge of Mr. Clarence Fendall, assistant, executed the details of th work, and subsequently prepared the maps of the same. To each o these gentlemen I am greatly indebted for the interest displayed i prosecuting their labor, and especially to the latter for the completenes and accuracy of its execution. The map is drawn on a scale of $\frac{1}{5000}$ showing not only the hydrography of the river, but also the topographica conformation of the shore. The depth of the water at mean low tid is represented in feet. Observations of various kinds were made a many points as to the nature of the soil at the bottom, the direction an strength of the currents in the channels, and the action produced b the rise and fall of the tides. It is found in water less than six feet tha the bottom is hard sand on the surface, through which an iron rod, on inch in diameter, can be thrust six feet by the force of two men. I greater depths than six feet the rod could be pushed down from seve to ten feet with the same physical effort, and the bed on the surface i of soft mud. The points on the map which are colored in purple locat

ne positions where current observations were made; the arrows indicate ne direction and velocity, one inch in length corresponding to one knot er hour. For the purpose of carefully examining what, if any, marked anges have taken place in the nature and depth of the channels, as well s of the general hydrographic condition of the river since previous surveys ere made, a plan has been prepared showing the alterations that have ken place during a period of more than 60 years. The earlier data are rnished principally from a map published in 1792, which approximately cates the channels and general features of the river at that time, and revious to the construction either of the Long bridge or of the causeway nnecting the head of Analostan island with the Virginia shore. This not probably very reliable in its details, although confirming the recol-ctions of some of the older inhabitants with whom the subject has ng been familiar, but it is nevertheless very interesting and suggestive. he later information is obtained from more recent and accurate sur-eys made respectively in the years 1857, 1862, and 1867. That in 1857 as made by Mr. R. W. Burgess, civil engineer, under the orders of aptain J. C. Woodruff, corps of topographical engineers United States my, and those in 1862 and 1867 by coast survey parties under the rection of Captain Patterson. From the maps prepared by them, acings of which are herewith submitted, we are enabled to make a mparison of the changes that have taken place at different intervals.

By an examination of the chart published in 1792, it will be observed at in that year there existed three distinct channels; the first may be lled the swash or shore channel, washing the banks of the city; the cond was the one known generally as the Washington or city channel; d the third, at present the only one not entirely closed to navigation ove the Long bridge, is denominated the Virginia or Georgetown chan-l. In the first a depth of 7 feet could be then had, and in the second er 9; through the third or main one, the soundings show that at least 1 feet could have been carried through its entire length. The average dth of these channels was about 200 yards, large marshy flats sepa-ting them from each other. A large rock called Braddock's rock, at e base of the hill upon which the United States observatory now nds, is said to mark the spot where the British general in 1755 landed portion of his war material, when contemplating his move upon Canada. channel of 7 feet then existed where now extends a low grassy expanse.

In the year 1806, the appropriation for which was made by Congress, d approved January 19, 1805, the causeway connecting Mason's island th the Virginia shore was thrown up for the purpose of deflecting the rge body of water that then passed between the two into the main bed the river, between the island and the Maryland bank. In consequence this the channel south of the island, through which a draught of 18 et could be had, has been entirely closed. Immediately below the cause-ay the depth of water is still over 30 feet, but gradually falls off to 1 2. A grassy marsh has since been formed, and now extends for me distance below the extremity of the island. The Long bridge was nstructed in 1809, that portion of it known as the causeway, 1,967 feet length, having been built on the flats separating the channels, and the mainder on wooden piles and crib-work. Two draws for the passage of ssels are respectively 134 and 148 feet in the clear. Although the ts had previously existed to a wide extent, and have no doubt since en enlarged by the greater quantity of debris borne along by the river d deposited where the opposing forces of the current of the one, and the tidal influence from the ocean first encounter each other, these posits yearly increasing in consequence of the more advanced culture

of the rich regions through which the waters flow, still examination recently made indicate that the flats have become more extensive, owin to the obstructions offered by the causeway, not quite so apparent abov the bridge as below it. The recent surveys, those made in 1857, 186 and 1867, at intervals of five years, indicate very decided changes in th regimen of the river as compared with that exhibited by the oldest acce sible chart. Where formerly three channels existed, now only one i practically useful for the present tonnage of the sea-going vessels sai ing between Georgetown and the Atlantic ports, and that has bee slowly but gradually filling up for a short distance, so that upon the ba which has been formed scarce eight feet of water can be found at mea low tide; vessels bound up or down have to wait for the flood-tide, cr ating delay and uncertainty. The old swash or shore channel ha entirely disappeared, scarcely a foot of water over the flat upon the ebb tide; so also with the one known as the Washington or city channel, th upper portion of which is closed to navigation, the present head bein about midway between the north draw of the bridge and the Washing ton monument, and even at that point scarce seven feet of water can b depended upon; only very light draught boats, chiefly used for trans portation of wood and lumber, pass through the draw of this channel t the entrance of the Washington canal, and then only on a high stage o water.

These great changes in the last 50 years have been the result of th constantly accumulating deposits in the bed of the river from the su face drainage and sewerage of the two cities, brought down by the Tibe and Rock creeks, from the washings from above and the wear of th banks by the varying currents, and from the effect of the ever shiftin bars formed by sunken wrecks, or the obstructions arising from th building of wharves and other necessary river encroachments. A care ful examination of the more recent surveys indicates marked change even during the brief intervals between the respective years in whic they were executed.

The plan previously referred to, exhibiting those alterations, accom panies this report. The curves laid down and indicated by differen colors show the positions of the curves of 6, 12, and 18 feet of water i the river, as ascertained at the different times the surveys were made the several depths being represented by full, broken, or dotted lines.

For example, before either the causeway at the head of the island o that at the Long bridge was built, the curves of 18 feet approached eac other from above and below, within 950 feet, with a channel of over 1 feet connecting them. While up to the present period we find that ther has been very little, if any, change in the depth of water between th island and the Washington shore since the first chart was published, th position of the upper curve of 18 feet remaining almost identically th same, still, in descending the river by the Virginia channel, such doe not continue to be the case; the depth had diminished since that time and by survey of 1857 the curve of 18 feet had receded over 7,000 feet, an its position was then only a short distance above the south draw of th bridge. In an interval of five years, as shown by survey of 1862, th same curve has commenced to advance up stream, although not very materially, having gained in that time about 360 feet. By the last sur vey, that of 1867, it is demonstrated that the same curve has continue to advance during a like interval, having moved up stream over 2,30 feet in the last five years. At the latter rate it will not take long t regain its position of 1792. These alterations have no doubt bee brought about by a combination of the causes above enumerated, aide

by those powerful agents, which brook no control, the immense freshets arising from the melting of the snows of the mountains and the heavy falls of rain, together with the great accumulation and pressure of the ice of winters when broken up and let loose by the advance of spring. Similar changes can be observed in the 6 and 12 feet curves of the Virginia channel during the same intervals, at one time receding and then again advancing, although not to the same extent as in those of the 18 feet. Along the course of the same channel, between the upper and lower termini of the 12 feet curves, a distance of 2,000 feet, a gradual deposit has been forming for years back, creating at one point a bar which has already seriously interfered with its navigation. During the last survey not more than soundings of eight feet were found on it at mean low tide.

Whilst these alterations have been taking place in the Virginia channel, others of considerable importance have been gradually made in the old Washington channel, exhibiting a tendency on the part of the current to reopen the bed of the latter.

Where formerly a depth of 12 feet could be had in its most shallow parts, the examinations of the last year show that the 12-feet curves up and down stream are now about 5,700 feet distant from each other, and the six-feet curves are separated by some 3,600 feet. At intermediate points from one to five feet only can be found upon the intervening flats. A comparison of the last three surveys shows, however, that, during the interval of 10 years, from the first to the last, the distance between the 12-feet curves has considerably diminished, and that the current now sets in the same direction as it originally had in the old channel. This is an interesting fact, and indicates that the river has a tendency to resume its old regime. Very little alteration has taken place in the shore lines above the Long bridge, and consequently, from this cause, the river has not been much deflected from its natural course. Immediately below the Little Falls the depth of water is over 80 feet, and continues very deep until the Aqueduct bridge is reached. There the soundings indicate 24 feet in the channel. Thence to a short distance below the southern extremity of Mason's island it decreases considerably, varying from 25 feet to 18, although at some intermediate points there is as much as 35 feet of water, particularly opposite Easby's wharf. Below that point, as has already been described, the river spreads out over a wide surface, the current becoming more sluggish, and the channel gradually contracting for some considerable distance, with scarce eight feet at mean low tide. Then, as the Long bridge is approached, the Virginia channel again widens out and gradually deepens. At the draw it is over 24 feet, and continues to increase in depth as the descent is made.

The Washington channel, now heading but a short distance above the long bridge, with only seven feet at its highest point, soon attains a depth of 12 as it passes through the east draw. Continuing to deepen, although but slightly, it in a short time joins, south of Greenleaf's Point at the arsenal grounds, the waters of the Eastern branch. Vessels drawing 18 feet can ascend the latter as high as the wharves at the navy yard. Formerly they could reach Bladensburg, but, from natural causes, the bed has been filling up. About half a mile below their junction, the combined streams unite with the Virginia channel, from which they have been separated below the bridge by broad, grassy flats. A depth of 40 feet and over is then obtained in the main channel.

The survey of last year did not extend below the Long bridge, but that of 1862 includes that part of the river between the bridge and Giesboro' Point, about a mile below the arsenal.

From examination it is evident that the Washington channel, both below as well as above the bridge, is being seriously impaired. It has decreased in width as well as in depth. Some plan must be adopted for its improvement, and its execution should not be unnecessarily delayed. A very large part of the trade of the city is dependent upon keeping this channel open, and interested in preventing it from being further damaged by both artificial and natural causes. This part of the subject will be subsequently referred to.

From the previous and already too extended description of the present condition of the river, it is also plainly apparent that, in reality, there is but one channel of the Potomac—the Virginia channel—which is practically useful at present for commercial purposes, so far as the entire city of Georgetown and a large section of Washington are concerned, and how long this one will remain so is a question which concerns every one interested in the welfare and prosperity of the two cities.

The examination proves very conclusively that it is gradually becoming impaired by the continuous formation of a bar or shoal in the middle of the channel, which, extending now but a short distance, will finally assume greater proportions, unless some artificial appliances be resorted to for its removal. During the period the surveys were being executed sea-going vessels occasionally stuck fast on the bottom at low water.

Any one who seriously studies the subject must be forcibly impressed with the great necessity of adopting some system of improvement for deepening either one or both of the channels, or by cutting a new one through which to force the entire body of water of the Potomac; this will never cease to be supplied in sufficient quantities for all navigable purposes. Instead of allowing the river to spread out over a wide surface, it should be confined in one channel, ample in width and depth; this once accomplished by the engineer, it will be found that nature will come to his assistance and aid in the operation of perfecting his plans. In anticipation of such improvements, legal measures should be taken for remedying all existing injuries to the channel, for the conservation of the shores and harbors, for preventing future encroachments in the construction of such works as may produce any damaging effect. Every encroachment should be received with the greatest jealousy. It need not be stated that the general government has a great interest in encouraging the river improvements to be proposed, and by assisting with liberal appropriations their execution. Had this step been taken before the late war it would be impossible to estimate the amount that would have been saved during that period; by the expediting of transportation alone, more than sufficient means would have accrued to compensate for the expense of the entire undertaking. Nor has the usefulness and necessity for such improvement on the part of the government ceased to exist; as long as the capital stands, so long will the need arise for a permanent and copious channel to meet the demands of commerce. As will be shown hereafter, the whole work will be remunerative in the greatest degree—the expense will be met by the advantages gained. It has been often stated that there are no more difficult and uncertain issues than those connected with the improvement of rivers, and, in submitting plans for those which will be proposed, it has been found desirable to endeavor to renew, as far as practicable, the old condition of the regimen of the river. As a great deal of time will necessarily be consumed in the preparation and obtaining of materials, and the construction of such necessary works as may be needed to execute any contemplated plan of permanent improvement, even should the necessary appropriation or

other means become available, it is recommended, in the first instance, to dredge out that portion of the Virginia or Georgetown channel where the existence of the shoal water demands it, and also to the same extent the Washington or city channel below the Long bridge, so as to obtain a suitable depth of water in each for such sea-going vessels as are of a proper tonnage for the trade of the river. The present channel will then be preserved for immediate use in the event of no funds becoming tangible within a reasonable time for more extended and important improvements. The channel ways should be in the minimum at least of 100 feet in width, with a depth of 12 feet at mean low water. In view, however, of the improvement to be finally proposed, it will only be necessary at present, as far as the Washington or city channel is in question, to dredge such shoals or bars as immediately require alteration, without going into any extension of its width. This will be attended with very little expense and not much loss of time; the machinery and labor to be employed becoming available during any temporary suspension on the other adjoining works. In respect to the Virginia channel, the plan for its present improvement is represented in the accompanying sketch, which exhibits the plan and profile, marked B, for connecting the 12-feet water curves. The distance to be dredged is 1,900 feet, and by calculation the amount of soil to be removed will be about 10,191 cubic yards. The distance is divided into sections of 100 feet, and the contents of each can be found by reference to the annexed table, marked channel B. Should the engineer in charge desire to accomplish the work without contracting for the same, it may be well to mention, as the questions are frequently asked, that one of the best dredging machines is said to be Osgood's patent, which, according to the latest and most reliable information, can raise from 300 to 500 cubic yards of soft mud or sand per day. Each of the machines owned by the government, and used at present in the Patapsco river, cost about $10,500. An estimate for this temporary improvement will be appended. Whatever opinions may be held or have been expressed by others in regard to the obstruction or encroachment in the river, in consequence of the building of the causeway of the Long bridge, it has been clearly demonstrated to me that there is no doubt of that structure being very injurious to the Washington channel, and that the section referred to should, therefore, be removed and replaced by either an arched bridge or one on piles of iron or wood. Those best acquainted with the river have pointed out a most marked increase during the last few years in the dimensions of the flats, and a consequent diminution in the width and depth of the channel. Whilst the causeway obstructs, to a considerable extent, the water coming down from the interior of the country, it also partially prevents the tide-water from flowing up; it therefore interrupts that continual scour which should result from the force of the one, and the flowing and ebbing of the other; the tides should have a perpetual and unrestricted current. "The great object to be kept in view, in carrying into effect the improvement of the navigation of a tidal river, is the free admission of the greatest possible quantity of water from the sea, as reliance must be chiefly placed upon the scour produced by the tide, and not upon the current of the fresh water as the chief agent in keeping open the navigable channel of the river." Many celebrated engineers have concurred in the above opinion; and this being admitted, "it is manifest that all obstructions to the tidal flow upwards should be removed," such as shoals and bars, or dams and dikes, or any other cause of obstructions. The length of the causeway, as already stated, is 1,967 feet, a somewhat formidable obstacle to either river current or ocean tide, and the esti-

mated cost of substituting for it the most simple plan of bridge, the pile or trestle or crib work, will not require a very large expenditure in proportion to the advantage to be gained. It is difficult to understand why the causeway was originally constructed. An estimate for its removal is herewith appended.

In my last annual report, dated October 1, 1867, it was stated that orders had been given me to prepare a special report to the bureau in regard to the improvement of the channel of the river, and that the bridge question was so intimately associated with the matter as to necessarily form a part of the document. Since then two very interesting and comprehensive reports in reference to bridging the Potomac at several points have been carefully examined, and the subject found to be very thoroughly exhausted. Should either of the plans proposed in reference to the present site of the Long bridge be adopted, it would necessitate the removal of the causeway. These reports were made at different periods to the Department of the Interior; the one was prepared by Alfred C. Rives, esq., civil engineer, and submitted to Congress by the Hon. R. McClelland, then Secretary, on the 7th of February, 1857, and the other by Colonel Silas Seymour, civil engineer, addressed to the Hon. O. H. Browning, the present Secretary, on the 18th of February, 1868.

The first report was printed several years ago for distribution, and the perusal of the second in the original manuscript was kindly afforded me by the author.

We have now discussed the temporary and at the same time the most economical and expeditious plans for improving the navigation of the existing channels; firstly, by deepening the two channels, the Washington or city, and the Virginia or Georgetown, by dredging the shoals to the depth of 12 feet at mean low water; and secondly, by the removal of the causeway of the Long bridge, which contracts the current and obstructs the flow of the tide, in order to obtain a larger volume of water to assist in scouring them out. The velocity of the current upon which mainly the scouring process depends is not great; the greater the reason, therefore, for removing any obstacle to its free action. It may be here stated that the rise and fall of the tides is about three feet, and that the velocity of the current in the channel is one-half mile per hour. The next questions to be considered have reference to some plan for the permanent improvement of the navigation of the river; several have been recommended, but to the present time not one has been executed or even adopted. There is a division of opinion as to whether one or both of the old channels shall be improved, and again whether both of them ought not to be closed and an entirely new one opened. One good, straight, broad channel will certainly be more preferable than two inferior ones, and the one which promotes the greatest amount of benefit and is most advantageous for the commercial interests of both cities, Washington and Georgetown, should be adopted, although it might not prove the most economical in the first instance.

If one can, therefore, be dredged out which will conform, as closely as possible, to the regimen of the river as it existed many years ago, before its waters were obstructed by the encroachments since made upon it, and should legal measures be taken to remove the latter, it would seem that such are the steps needful to be taken.

From the different surveys made it is evident that the current of the river has still a tendency to set in the direction of the old Washington or city channel as laid down on the earlier maps, running parallel to the bold curved shore which forms the city front; a pocket has been formed showing this tendency, and within the last few years it has been grad-

nally extending and deepening. The current is somewhat deflected from taking what otherwise would apparently seem to be its natural course by the encroachment of Easby's wharf, and by obstructions offered at and near the same place by rocks which appear above and below the surface of the water, and which should be removed before any extended improvement is commenced. What would then seem to be the most natural plan is to connect deep water a little above the east draw of the Long bridge, where the river washes against high bluff banks, with deep water below Easby's wharf, the course of the new channel following the general direction of the current, and taking advantage at the same time of the most favorable profile.

The plan and profile of the proposed new channel is exhibited in one of the accompanying sketches. It should be at least 12 feet in depth at mean low water, and 100 feet in width; the length of the cut will be about 5,700 feet, and the quantity of soil to be removed is calculated to be 162,621 cubic yards. An examination of the bottom of the river proves that it is perfectly feasible to dredge the channel to the necessary depth, frequent borings of the sub-soil having furnished satisfactory results.

In computing the cubic contents to be removed proper allowance has been made for the caving in of the sides of the channel, assuming that they will take a slope of 45°, the soil being composed of hard sand. The material removed can be conveniently deposited on the grassy marsh between the edge of the channel and the main slope, thereby embanking and reclaiming about 220 acres, the greater part of which would prove an extension to that part of the public grounds called the Mall. Although it is not advisable to contract the banks so as to prevent the spread of the water and intercept the tidal flow, still as the river is so broad at this point and the space reclaimed so limited, no very serious damage can be anticipated.

Among the several river improvements of the present century which have proved most successful, the greatest depth of water has been obtained by artificial means, principally by dredging, aided when favorable by the scouring process of the tides. Should the soil prove too soft and not adopt a proper slope, quarter or half tide dikes can be used to guard the channel. A more substantial and permanently useful improvement for protecting it along the city front would be to build a sea-wall, which would also act as a retaining wall for the reclaimed land.

By opening this new channel the force of the current will aid in scouring out that part of the old city channel below the Long bridge, which, as has already been stated, is being seriously impaired. The removal of the causeway of that bridge is a *sine qua non* in respect to the successful execution of any of the plans. Nor will this improvement produce any injurious effect upon the channel of the East Branch, as the two glide into each other at an acute angle and together assume a gentle continuation of the curve of the shore as far down as Alexandria, where it is again deflected towards the opposite bank.

Appended is a table marked channel A, exhibiting the contents of each section of a hundred feet through the proposed cut, and an estimate for dredging the channel is annexed.

Whether or not sufficient water will pass through the new channel when opened, without the aid of the artificial appliances, to deflect it from the Virginia channel, is a question requiring great consideration; and the fact of the Potomac being influenced by the tides to a higher point than the proposed work, renders it necessary to examine whether or not dikes might be so constructed, without proving injurious, as to give to the current a suitable direction. If properly directed, the whole

mass of water can be usefully employed, instead of wasting its power by being spread over the present broad surface of its bed.

In the very able and suggestive report by Mr. Alfred Rives, to which reference has already been made, upon the subject of opening a new channel, he proposes the building of a breakwater from the southern extremity of Mason's island to deflect the current. In the same connection he remarks that the advantages resulting from a combination of the arrangements suggested would be permanent, "because the river will be confined in a sufficiently narrow channel for more than a mile below Easby's wharf by the proposed breakwater, which it leaves in a direction normal to the Long bridge, finally passing through the opening reserved for it, and becoming tangent to a bold curved shore of wonderfully regular outline. It is well known that currents in curves form stable and deep channels." The building of such a breakwater would have the tendency, sooner or later, to close entirely the Virginia channel; instead of being preserved for navigable and commercial purposes, its place would be occupied by marsh or meadow-land which would eventually form; this would be but a continuation of the process already going on, in consequence of the building of the causeway at the head of Mason's island.

Again, in constructing such a breakwater or dyke, and thus contracting the width of the stream, what would be the general effect in the course of time upon the new channel, should one be opened, and would not such a work, perhaps, prove an impediment instead of an improvement to navigation, by preventing and thereby decreasing the flow of tide? Considering, however, the very great width of the Potomac opposite the two cities, where the upward tidal flow and the downward current of the river encounter and apparently hold each other in check, and also the short distance above the proposed improvement to which the tide ascends, to say nothing of the small rise, it does not seem very probable or possible that any very great damage will result from building a breakwater to deflect the entire mass of water into the new channel.

It is to be conceived that a river can be too wide at certain places, which is especially the case at the head of tide navigation on the Potomac. The first and great injury to this portion of the river was the construction of the causeway which closed the old main channel between the island and the Virginia shore. This should be lowered so that its upper face would not exceed the level of mean high tide. It would then offer no obstruction to the passage of the waters of the overcharged river during freshets, thus preventing inundations and great damage to property. It would, in that event, have to be strengthened; in fact, rebuilt on a different plan. For the same reason the elevation of the proposed breakwater should be but very little higher than the same level of mean high tide. In constructing the work it might be built in sections, and as it progresses the practical effect upon the action of the current could be observed, and any needed change in the plan would suggest itself. The section across the Virginia channel should be the last one completed, in order not to interfere until the last moment with the navigation through it. It is a question, especially in an economical point of view, whether a breakwater from the southern extremity of Mason's island, and parallel to the current of the river, will be more advantageous than a dam or pier built perpendicular to its general direction, and extending from the Virginia shore, across the old channel, to near the edge of the new one. On the sketch the position of such a dam is located, it being laid down along the line of least water, as the profile will show. The selection of a dam, in preference to the break-

water proposed by Mr. Reeves, is that the first will be much shorter, more conveniently built, and consequently a more economical structure. The difference in the practical working of each will not be very great. The report which gained some currency during the early part of 1867, and assumed an official recognition by the action of the board of trade of the city of Washington, in offering a preamble and resolution on the 11th of February of that year, that the previous heavy "freshets in the Potomac had caused the channel on the Virginia side of the river to be blocked up so as to cause the flood to seek an outlet across what is known as the 'flats,' thereby opening the original channel of the Washington side of the river," was not entirely based upon the facts as they exist, the recent survey proving that no such change had taken place to the great extent above quoted. It was also stated that the heavy ice formed a natural breakwater, similar in its effect to the one proposed by Mr. Reeves. This combined action of the freshets and ice will no doubt account for the tendency, already mentioned, in the river to resume its old channel, and offers a strong argument in support of the plan proposed.

If the plan for a dam should be adopted, the following would be its dimensions: The required length is 2,560 feet, with a width of 15 feet on top and 15 feet in height, the average depth along it being 9 feet, and the slope being assumed at 30°. A section (trapezoidal in figure) would contain 275 square feet. The contents of the dam would be about 26,000 cubic yards. The stone for its construction can be conveniently obtained from the quarries and boulders a short distance above the projected work, at or near the Little Falls, and transported from thence on barges. An estimate for building the dam is herewith transmitted.

Besides the very great advantage which would accrue to Washington and Georgetown, in a business and commercial point of view, other most beneficial results would be derived from their execution. The low, marshy flats which now line the river fronting the city, adding so much to the unhealthy condition of the atmosphere, and presenting so unsightly an appearance, would be reclaimed, and in a short time, it is to be hoped, add greatly to the beauty of the public grounds in that section.

Again, by opening a cut for the Tiber to pass into deep water of the new channel, the sewerage of the city, a subject which should receive most careful and studied attention on the part of its inhabitants, would be scoured off by the strong currents of the river, instead of spreading over the flats and generating pestilential vapors, with which to infect the whole community. These great advantages will certainly deserve the consideration of the reflecting citizen, and compensate for the comparatively small pecuniary expense of the undertaking.

A statement, setting forth the amount of tonnage arriving at and departing from both Washington and Georgetown, during the last year, 1867, is appended.

The following is a list of maps and plans which accompany this report:

1. Map of Potomac river, published in 1792.
2. Map of Potomac river, surveyed in 1857 by Captain Woodruff.
3. Map of Potomac river, surveyed in 1862 by Captain Patterson.
4. Map of Potomac river, surveyed in 1867 by Mr. Fendall.
5. Plan showing the alterations in the channel of the Potomac river, ascertained by surveys in 1792, 1857, 1862, and 1867.
6. Hydrographical map of the Potomac river, above the Long bridge, showing the proposed channel and dam for connecting deep water at Georgetown with deep water at the Washington wharves. Channel 100

feet wide and 12 feet deep. Also, a plan for connecting the 12 feet water-curves in the Virginia channel. Hydrography from soundings made in 1867 and reduced to mean low water.

I am, general, very respectfully, your obedient servant,

N. MICHLER,
Major of Engineers, Brevet Brig. Gen'l U. S. A.

Major General A. A. HUMPHREYS,
Chief of Engineers, Headquarters Corps of Engineers,
Washington, D. C.

CHANNEL A.

Section.	Length.	Average depth.	Cubic yards to be removed.	Section.	Length.	Average depth.	Cubic yards to be removed.	Section.	Length.	Average depth.	Cubic yards to be removed.
	Feet.	*Feet.*			*Feet.*	*Feet.*			*Feet.*	*Feet.*	
1	100	11	374	21	100	5	2,774	41	100	1½	4,296
2	100	10½	659	22	100	4¾	2,881	42	100	1½	4,296
3	100	10⅜	470	23	100	3⅝	3,307	43	100	1¼	4,185
4	100	9½	948	24	100	3½	3,533	44	100	1⅜	4,185
5	100	9⅜	948	25	100	3⅜	3,533	45	100	1⅜	4,185
6	100	8¼	1,407	26	100	3⅝	3,307	46	100	1¼	4,185
7	100	8⅛	1,274	27	100	4	3,200	47	100	1¼	4,185
8	100	8⅛	1,274	28	100	3	3,633	48	100	1	4,522
9	100	8	1,541	29	100	3	3,633	49	100	2¾	3,744
10	100	8	1,541	30	100	2½	3,852	50	100	3½	3,407
11	100	7⅜	1,674	31	100	2¼	3,963	51	100	4¼	3,093
12	100	7¼	1,811	32	100	2	4,074	52	100	5	2,774
13	100	6½	2,148	33	100	1⅞	4,185	53	100	5¼	2,563
14	100	7	1,944	34	100	1⅞	4,185	54	100	7	1,944
15	100	6½	2,148	35	100	1¼	4,296	55	100	8½	1,333
16	100	6⅛	2,219	36	100	1⅛	4,296	56	100	9½	948
17	100	6	2,356	37	100	1⅞	4,185	57	100	9¾	852
18	100	5¾	2,563	38	100	2	4,074				
19	100	5½	2,563	39	100	1⅞	4,185				
20	100	5¼	2,670	40	100	1½	4,296				162,621

CHANNEL B.

1	100	11	374	8	100	9½	947	15	100	11½	185
2	100	10½	563	9	100	11	374	16	100	10	756
3	100	11½	185	10	100	10½	563	17	100	10½	563
4	100	10	756	11	100	9½	947	18	100	11½	185
5	100	9	1,144	12	100	11	374	19	100	11¾	93
6	100	8½	1,311	13	100	11½	185				
7	100	10½	563	14	100	11¾	93				10,191

Estimate of river improvements.

	Cubic yards.	Cost per cubic yard.	Amount.	Remarks.
Removal of causeway at Long bridge	34,867	$0 40	$9,966 80	Brickwork, stone, and filling.
Section of bridge to replace causeway	.....	.....	15,000 00	400 piles of 40 feet each, flooring, &c., &c., 300,000 feet, board measurement.
Dam or breakwater foundation, and superstructure masonry and coping	26,000	15 00	390,000 00	
Dredging new channel	162,621	35	56,717 35	
Total	.....	.....	471,864 15	

Improvement of Virginia or Georgetown channel.

	Cubic yards.	Cost per cubic yard.	Amount.
Dredging	10,191	$0 35	$3,566 85

CUSTOM-HOUSE, *Georgetown, D. C., May* 16, 1868.

SIR: The custom district of Georgetown comprises all of the District of Columbia, and the Maryland side of the Potomac river for 30 miles below this, and to the head-waters of the Potomac on the Maryland side.

The tonnage of vessels belonging to this district is 22,455 88-100 tons. The number of vessels entered for the past year, 373. Number of vessels cleared for the same time, 205.

You cannot judge of the amount of business done in this district from the number of vessels entered and cleared, for vessels in the coasting trade are not required to enter or clear at the custom-house unless they have foreign goods or distilled spirits on board. I suppose there are at least 20 vessels arriving here, which do not enter or clear, for each one that has to do so.

Very respectfully, your obedient servant,

JAMES A. MAGRUDER, *Collector.*

General N. MICHLER,
In charge of Public Buildings, Grounds, and Works,
United States Capitol, Washington, D. C.